



FRIDAY, SEPTEMBER 17, 1897.

CONTENTS

ILLUSTRATIONS:	PAGE.	GENERAL NEWS.	PAGE.
Enlarging the Covington and Cincinnati Suspension Bridge.....	644	Railroad Law.....	657
Proposed Signals at Passaic River Draw-bridge.....	648	Meetings and Announcements.....	657
A Sixty-Ton Steam Shovel.....	649	Personals.....	658
Rolled Steel Car Axles.....	651	Elections and Appointments.....	658
CONTRIBUTIONS:		Railroad Construction.....	658
British Railroads in 1896.....	643	Electric Railroad Construction.....	659
The Balanced Compound Locomotive Again.....	643	General Railroad News.....	659
EDITORIALS:		Electric Railroad News.....	660
The Emporia and New Castle Collisions.....	652	Traffic.....	660
Annual Reports—Cleveland, Cincinnati, Chicago & St. Louis—Washington—Chicago Great Western—Long Island Railroad.....	652	MISCELLANEOUS:	
EDITORIAL NOTES.....	652, 653, 654	Technical.....	654
NEW PUBLICATIONS.....	654	The Scrap Heap.....	656
TRADE CATALOGUES.....	654	The Derailing Switch as a Moral and Physical Safety Device.....	643
GENERAL NEWS:		The Precision of Electrical Engineering.....	643
Locomotive Building.....	656	Annual Convention of the Roadmasters' Association.....	645
Car Building.....	656	Master Car and Locomotive Painters' Association.....	64
Bridge Building.....	656	Railroad Building in the South.....	650
		American Pneumatic Tools Abroad.....	550
		The Railway Signaling Club.....	650

Contributions.

British Railroads in 1896.

NEW YORK, Sept. 13.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Permit me to add a word to your review of the results of working the railways of the United Kingdom last year [*Railroad Gazette*, Sept. 10, p. 634].

The gross increase of revenue over the previous year was £4,200,000, of which increased working expenses absorbed £2,400,000, leaving £1,800,000 as increased net earnings. But there was, as has been said, £28,000,000 of new capital on which to pay interest, so the final result was only to raise the average return on the capital from 3.80 to 3.88 per cent. Seven years ago at the time of the last "boom" in English trade a gross revenue of £77,000,000 and a net revenue of £37,000,000 gave an average return to capital of 4.21 per cent. An increase since then of £13,000,000 gross gives only an increase of £3,000,000 millions net, with an actual decrease of one-third of one per cent. in the rate of remuneration of capital. Better proof could hardly be desired of the truth of the railway managers' constantly repeated assertion that concessions to the public and concessions to the staff are absorbing more than all the profits naturally due to increased density of traffic.

W. M. ACWORTH.

The Balanced Compound Locomotive Again.

NEW YORK, Sept. 13.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your editorial in your issue of Sept. 10 has been read with interest. I would only call attention to one point where you give the case of a recent ten-wheel engine that weighs 134,300 lbs., and say that, "If we take Mr. Strong's figure and assume that on the low-pressure side of this engine 800 is the portion requiring to be balanced, and if each side of the engine were balanced independently of the other, an excess of 267 lbs. would be required in each driver on the low-pressure side. The weight on the drivers of this engine is 17,183 lbs." The drivers of this engine are 66 in., and if we apply the same formula to it that Professor Goss has applied to Schenectady No. 1, at Purdue, we would have, at 60 miles an hour, an excess pressure, due to excess balance, of 9,612 lbs., for each wheel, which, if added to the normal load, would give on rails, when counter-weights are down, a load of 26,795 lbs., on each wheel; or for an instant, there being three counterweights down at one time, we should have an engine weighing 134,300 plus 28,836, or 163,136 lbs., of which 131,932 lbs. is on the driving wheels and close enough together to come on one post or bent of a bridge.

I would like to ask if the General Manager of the road for which this engine was designed would consent to have an engine weighing as much as 163,136 lbs., of which 131,932 lbs. is on six coupled wheels, so close together as to give this concentrated load on one post or bent of the bridges on his road? If he be willing to, I should like a copy of his bridge specification.

Very few roads have bridges or tracks that would stand more than 4,000 lbs. to each rail per linear foot, which, for a 13-ft. driving wheel base, would be 104,000 lbs. for the distance on which 131,932 lbs. would be brought by this locomotive, and while it is not a constant rolling load, it is worse, as it is a load varying from 131,932 to 74,303 lbs., which is the load that is on the drivers when the counterweights on one side are up, or the variation of load occurring each one-tenth of a second is 57,590 lbs., which is enough to start any bridge to vibrating, so that its own weight is added to the weight of the locomotive to help break it down.

With a properly balanced locomotive and bridges capable of carrying such a load he could increase the weight on each driver 9,612 lbs. for each, or for the six

drivers 57,672 lbs., which, added to the normal of 17,183 lbs. on each, would give a total of 160,688 lbs. on drivers, or more than 50 per cent. in increased power and capacity on the same roadbed and bridges that he now proposes to use this engine on.

The counterbalancing question, instead of being settled is becoming more serious as the weights and speeds increase. Railroads have got to the limit, and passed the safe limit, that can be carried on the present roadbeds and structures, and still the demand for greater capacity and greater speed is not satisfied.

The rules devised by the Master Mechanics' Association, only look at this question from one side of it. They only consider the question of the ability to pull trains on time and at the least cost to the motive power department, and they do not consider the road master's department, or the bridge department, or the maintenance of way account.

All this points one way; the locomotive of the future will be a balanced locomotive, and that it will be a compound locomotive, for, by compounding in the right way, a balanced locomotive will be secured, and, as the demands for more power and greater speed increase, the steam pressures will increase and we shall soon have locomotives carrying, instead of 200 lbs., 250 pounds, and then we shall probably have triple-expansion engines, which will do their work on 2 lbs. of ordinary coal and which will not be any more expensive per horse power or per square foot of heating surface or grate area, or more complicated than the ordinary simple locomotive or two-cylinder compound of to-day.

As to the Balanced Compound Locomotive No. 1, I have no apologies to make, for I am confident that, if this engine be properly handled, she will give a very good account of herself; but as to whether she is to be the final form of a balanced compound locomotive, I am not satisfied to make that statement, as I believe a very much simpler form can be designed to accomplish everything that this engine can accomplish and have some advantages that she does not possess.

I recognize the fact that if one part can be made to do the work of two parts that would be the form of machine most acceptable, but in all radical departures, as this is, it is not always easy to arrive at the final form or design on the first attempt.

GEO. S. STRONG.

The Derailing Switch as a Moral and Physical Safety Device.

There has been some difference of opinion as to the utility of a derailing device at crossings and drawbridges. It has been impossible to secure accurate data either for or against the use of a derailer, but the preponderance of evidence secured by the speaker was in favor of the derailer. Even if it be an evil it is the least of two evils. The first English interlocking used in this country, that at East Newark, N. J., had derailleurs or diverting tracks for secondary running tracks, but none for high-speed tracks. It is uncertain when derailleurs were first introduced on main lines. English railroads have got along without derailleurs because they impose money fines for disregard of signals, and thus have at length produced a class of careful enginemen.

As it is possible for a signalman to change a switch after a train has approached too near for a change to be made with safety, there must be some protection against such blunders. The increasing speed of passenger trains makes this necessity every year more pressing. The idea that the use of derailing switches is specifically required by law in Illinois is erroneous. The rules of the Commissioners of that state require derailleurs where necessary, but this is not a statute requirement. The law simply requires that crossings be made safe against collision. The rules of the Commission were formulated by Mr. Hansel several years ago and were approved by the engineers of several prominent Illinois railroads. If these engineers, or any engineers representing the best roads and best practice in Illinois, were to formally assert that the derailing switch is unsafe, the Commissioners would, no doubt, change their rule.

In order to secure definite expressions of opinion Mr. Hansel has lately sent inquiries to officers of prominent railroads on which the signal practice is intelligent, and he gives in his paper the substance of the answers. These answers, a dozen of them, are practically all in favor of the derailing switch at crossings and drawbridges, though the facts given are of both kinds, favorable and unfavorable. One of them reports five derailments in seven years, though one of these was due to defective apparatus, a signal having shown clear when the derailing switch was open. The writer states, however, that in none of the five instances cited would a collision have occurred, as there were no trains approaching on the transverse railroad. One of the writers has discontinued the use of derailleurs at most of his junctions and another believes that they should be omitted where surrounding objects are such that a derailment would be particularly disastrous.

Mr. Hansel holds that "on high embankments or on any embankment that would be sufficiently high to capsize an engine a guard rail should be carried well up to the crossing or junction (to guide the train after it has been derailed), and in order to counteract the effect of the guard rail, which is to carry the train onward to the point of collision, we should move the derail far enough back to give the maximum degree of safety."

* Abstract of a paper by Charles Hansel, M. Am. Soc. C. E., read at the meeting of the Railway Signaling Club, New York City, Sept. 14, 1897.

However, where there is no embankment and on single track lines I would not favor the guard rail. I think, however, that on double tracks guard rails should be provided whether there is an embankment or not."

As to the use of sand tracks, such as are used to destroy the momentum of freight cars in yards in Germany, Mr. Hansel thinks that in cold weather we should let the sand freeze up, so that there would be a smooth surface, strong enough to sustain an engine. Diverting tracks can, of course, be used instead of derailleurs wherever practicable.

Referring to a recent remark in a signal discussion that derailleurs were not used as much in the East as in the West, Mr. Hansel says that he finds no geographical distinction; there are as many in the East as in the West.

Mr. Hansel here goes on to describe the electric locking apparatus made by his establishment, the National Switch & Signal Company, a diagram of which was published in the *Railroad Gazette* of Sept. 10. This, he says, can be installed and maintained at a low cost. When a home signal is cleared it locks the derailer, which cannot be opened again until the train has passed over the crossing. The speaker had never seen a drawbridge where a derailer would not be desirable. At this point he submitted a diagram showing an arrangement of signals and derailleurs designed by his company for a drawbridge on the Erie road at West Arlington, N. J. (This drawing is shown elsewhere in this paper.)

Speaking of the crossing disaster at Atlantic City in 1896, Mr. Hansel said that, on one of the roads interested, an order was pending at the time for a signal plant in which there were a number of derailleurs, and these derailleurs had not been approved; but immediately after the disaster the plans of the signal company, calling for derailleurs, were at once approved, together with electric locking. In closing Mr. Hansel said:

"The experience of signal engineers and operating officials in this country ought to be such as to enable us to decide this important point at the present time, and it is certain that the derail and electric locking ought to be considered in the same light, at all points presenting similar conditions. There ought, however, be no fixed distance or method of locating it; the place and the manner should be determined by the conditions of the tracks and the character of the traffic. And unless the derail is the lesser evil of the two it should not be installed; there may be conditions where the installation of a derail might prove not to be a factor of safety, in which case it should certainly be omitted. In any argument of this case the signal engineers should follow the ever-changing conditions of traffic, and those charged with the moral obligation to study the conditions should throw aside precedent which has not been confirmed by practice."

The Precision of Electrical Engineering.*

BY FRANCIS B. CROCKER.

There still exists quite a general idea that electricity is so imperfectly understood that its laws and actions are little more than matters of chance or guesswork. The experience of the electrical engineer is supposed to consist of a series of surprises and shocks to his mind as well as to his body. This notion is not confined to the ignorant, but is believed by many educated persons, even including our brother civil and mechanical engineers; indeed, some members of our own profession hear this opinion expressed so often that they partly accept it as true, or at least they have no ready arguments with which to refute it. During the present year, the president of a large steam railroad on which electric propulsion is being tried, publicly expressed his opinion that electrical engineers know little or nothing of their subject. In legal decisions in this country and abroad, judges have stated that electricity was so vaguely understood that testimony concerning it was of no practical value.

The idea that "no one knows what electricity is, therefore we know practically nothing about it," is often expressed by those who want to excuse their own ignorance of the subject. They are glad to think that they are no more worse off in this respect than the rest of the world. Their deduction is quite natural, but is absolutely fallacious. While we must admit that we do not know the real nature of electricity, the same limitation of knowledge applies to all other fundamental facts. Gravitation is the most familiar of natural phenomena, yet we have no conception whatever of what it actually is. Our theories and mental pictures of the nature of electricity are much more definite than those concerning gravitation. In regard to the latter, little progress has been made since the time of Newton, while electrical knowledge has advanced and is now advancing with giant strides. There is every reason to believe that we shall "know what electricity is" and be able to explain the inherent mechanism by which electrical actions take place, before we understand how and why a stone is drawn to the earth. What we do know, however, are the laws of both electricity and gravitation, as well as the results that they produce, and it is very doubtful if our ability to control, measure and utilize these agencies would be improved even if we understood their exact nature. The laws and applications of hydraulics would be just as definite and successful even though the fact were not known that water is composed of two atoms of hydrogen and one of oxygen. It is possible that methods of generating electricity may be advanced when its real character is discovered, but it is not likely that this knowledge will greatly affect the methods of handling and using it.

The electrical profession has only very recently gained for itself a position of independence and equality among the branches of engineering, but it can now fairly claim to be an example for the others to follow, not only in the magnitude and rapidity of its results, but also in the exactness and certainty of its methods. Let us consider what are the principal facts upon which this strong claim is based.

The names connected with electrical science.—Gilbert, Franklin, Faraday, Ampere, Maxwell, Henry, Helmholtz, Kelvin, and a long list of other distinguished electricians, are not men whose ideas are vague or incorrect. Indeed, it is a significant fact that the ablest and most profound scientific men have been attracted

* Extracts from Inaugural Address of the President, at the 14th General Meeting of the American Institute of Electrical Engineers, Eliot, Me., July 26, 1897.

by and have performed some of their best work in the study of electricity.

The rapid progress of electrical science and its applications is an absolute proof of sure and exact knowledge. Uncertainty would necessarily cause delay, and error would involve repeated trials before success could be reached. The fact that the difficult arts of long-distance transmission of power and electric traction have been developed to their present state of importance and success in about ten years, shows conclusively that electrical theories and designs agree very closely with the actual facts.

The great results accomplished by electrical engineering is probably its strongest claim. Among the most striking of these examples are the locating of faults on submarine cables, telephoning a thousand miles or more, transmitting power over 100 miles, sending simultaneously a number of messages on the same wire, utilizing the power of Niagara, and producing the Röntgen ray. These and hundreds of other wonderful feats are not accomplished by chance, or by groping in the dark.

The close relationship between pure and applied electrical science is still another proof of the exactness and truth of both. If knowledge were complete, theory and practice would become identical. The agreement between theoretical and practical electricity is largely due to the small losses which occur in electrical apparatus and processes. Even quantities which correspond to friction in mechanics, such as electrical resistance and magnetic hysteresis, are capable of exact calculation. It is only the purely non-electrical factors, such as the friction of bearings and air resistance, that are uncertain in designing electrical machinery. With coal we must know its quality, including both its physical and chemical properties, in order to make even approximate calculations concerning it. In the case of steam, pressure and volume are not sufficient data; the amount of moisture or superheating must also be known.

A historical example of the agreement between electrical theory and fact is the brilliant work of Ampere, who gave to the world a beautiful and complete theory of electro-magnetism within a few days after he heard of its discovery by Oersted. The work of Maxwell is another great example of the power of the intellect to deal with electrical problems. Hertz said, in regard to Maxwell's electro-magnetic theory of light: "It is impossible to study this wonderful theory without feeling as if the mathematical equations had an independent life and an intelligence of their own; as if they were wiser than ourselves, indeed, wiser than their discoverer; as if they gave forth more than he had put into them. And this is not altogether impossible; it may happen when the equations prove to be more correct than their discoverer could with certainty have known."

To take a concrete example, the losses in transforming electrical energy are only two or three per cent., and if an error of 10 per cent. is made in calculating these losses, the actual error is only two or three-tenths of one per cent. It would, therefore, be possible to design a system in which electrical energy was transformed many times, and yet the final error would only be one or two per cent. If, on the other hand, the losses in mechanical engineering are ten or twenty per cent. or even 50 per cent., as is often the case, an error of 10 per cent. in calculating these quantities would soon become multiplied to a large figure.

Exactness in electrical units and terms is another strong point of electrical engineering, because definiteness in terms and ideas go hand in hand. The system of electrical units is complete and scientific, being based directly upon the C. G. S. system, and is the only example of a set of units which are universally adopted. The metric system is not in use in the United States, England and her possessions and many other countries, but the same electrical units are accepted by all nations. This avoids the great confusion which arises from the use of several different units for the same thing, as is the case in steam engineering, in which at least four different heat units are commonly employed.

In electrical engineering the distinction between the various quantities is usually more clearly understood, as for example the difference between force, work and power. In other branches these quantities were often confused, and the fact that mistakes of this kind are not more often made at present is largely due to the influence of electrical engineering in the accurate use of terms. The useful word torque has been introduced through electrical engineering, although it is a purely mechanical quantity. The adoption of such terms as impedance and reactance gives a nicety of expression which is rarely found in other applied sciences.

The facility and accuracy of electrical measurements contributes greatly to the precision of electrical engineering. Volts and amperes can be easily, quickly and accurately measured by means of convenient portable instruments. The product of these volts and amperes gives the watts or power which is the most important quantity.

The enormous range in electrical engineering is still another proof of its precision. The same laws and principles which apply to the almost infinitesimal galvanometer current are equally applicable to the current from an electric light station. The former may be only a hundred billionth of an ampere and the latter reaches ten thousand amperes, which is a thousand million million (10^{17}) times greater.

An even greater ratio than this represents the range of resistance measurements. In the case of large copper bars, a determination to within .000001 ohm is often required, and for insulation testing 10,000 megohms is not an unusually high figure. This gives a range of measurement of ten thousand million million (10^{16}).

An electrical instrument, the bolometer of Professor Langley, is used to measure the heat received from the fixed stars, and electricity is also the agent selected when 100,000 H. P. are to be distributed from Niagara. Instead of saying that electricity is selected for these extreme uses, it would be more correct to state that it must be employed, just as it is the only means of transmitting speech a thousand miles or performing the many other miracles of which it alone is capable.

The directness and high efficiency with which electrical energy can be converted into other forms is another fact which gives exactness to our work. It can be transformed into heat, light, magnetic, mechanical or chemical energy by the simplest means, and, conversely, the latter forms, with the possible exception of light, can be readily changed into electrical energy. In most cases the conversion is almost perfect, the efficiency of an electric motor or dynamo being usually over 90 per cent. and often 93 or 94 per cent. The chemical energy in a storage battery represents nearly 90 per cent. of the watt-hours applied to it, assuming the losses in charging and discharging to be about equal. The storage of magnetic energy may be effected at an even higher efficiency of 97 or 98 per cent. and the conversion of electrical energy into heat is complete, the efficiency of an electric stove actually reaching the ideal figure of 100 per cent. The production of light cannot be accomplished so economically; nevertheless the arc lamp has a far higher efficiency than any other source of artificial light, although it is usually

stated to be only 8 or 10 per cent. It is also more than probable that the long-sought-for high efficiency lamp will be an electric one when it is finally invented. This facility and economy of transformation puts electricity directly in touch with the other sciences and their applications, avoiding the chances for error which round about processes necessarily involve.

It has been shown that there are no less than eight substantial grounds upon which the precision of electrical engineering is based. The consideration of these incidentally brings out several concrete examples, but it will be well to cite a few other special instances which demonstrate electrical exactness.

The one which first claims our attention not only on account of its historical precedence, but also from its wonder-compelling results, is the locating of faults in ocean cables. In this connection I quote from information kindly furnished me by one of the Vice-Presidents of the Institute, Mr. A. E. Kennelly, who has had a long and successful experience in this branch of the profession. He states that "in the case of cable coiled in a tank and which has been taken into the tank over a measuring drum without being subjected to any considerable tension, the precision with which a fault in the gutta-percha can be located is sometimes very considerable. I have known one or two cases in which a fault has occurred in a length of say 30 miles of cable immersed in water and maintained at practically one temperature in the tank, and in which, by means of the Varley loop test repeated many times and under various conditions to eliminate constant errors, the electrical position of the fault has been determined to within a probable error, representing about 20 ft. of length. On turning the cable over from one tank to another by a 7-ft. drum on which the cable makes three turns, and cutting the cable when the computed distance has been run over, the fault has been found on the drum, that is in the 60 ft. or so of cable then lying on the drum."

The methods employed in locating faults in underground conductors are quite similar to those used for submarine cables, but the results are less striking and important. Mr. William Mayer, Jr., who is an authority on this subject, cites a case in which the calculated position of a fault was 2,343 ft. from the testing end of an underground cable 4,200 ft. long. The defect was found at the exact point indicated. The alternative would have been the tearing up of the street and cutting through a heavy iron pipe until the fault was found, as the conduit was not provided with manholes. One way to locate a ground connection, which illustrates the simplicity and certainty of electrical testing, consists in sending a current through the conductor to the ground through the fault in the insulation. A compass carried along over the cable will indicate by its deflection or non-deflection when the fault is reached. The facility of overcoming distances and obstacles impassable to other agencies is characteristic of electricity and magnetism.

The paper on "The Alternating Current Induction Motor," presented by Vice-President Charles P. Steinmetz at this meeting of the Institute, affords an excellent example of the marvelous precision of electrical engineering. Two curves are shown which give the efficiency, speed, power-factor and other characteristics of a three-phase induction motor under various conditions. These curves were all predetermined by calculation. In the same figures the results obtained by actual test are also marked by small crosses. The agreement in all cases is so close that curves plotted from the actual results of tests would practically coincide with those predicted by calculation. This is all the more remarkable when it is remembered that the three-phase motor is one of the newest of electrical machines, and is a difficult problem from a theoretical standpoint.

We naturally suppose ourselves to be familiar with mechanical energy and heat; but as soon as we convert these well-known forms of energy into that extremely subtle and mysterious agent—electricity—it immediately becomes far more definite and convenient to control, measure, transmit and utilize. In becoming untamable, it forthwith acts as the most reliable and matter-of-fact tool in the hands of those familiar with it. For example, the quickest, neatest and most exact method of making a test of mechanical friction, or the power required in any given case, is by the use of an electric motor. In this way, for example, we can determine the friction of different bearings or lubricating oils under various conditions of pressure and speed, or the power consumed by fans, pumps and other machines.

Quite a striking example of the possibilities of electrical measurement is the determination of the E. M. F. of a dynamo machine without running it, which I saw successfully carried out more than 10 years ago. All that is necessary is to measure the torque exerted by the machine with a given current in its armature. This may be accomplished by simply clamping a stick of wood to the pulley and weighing the pull at a given radius by means of a spring balance. If the same machine were run as a dynamo and had no losses it follows that

$$\frac{EI}{746} = \frac{2\pi rSP}{33,000},$$

$$\text{whence } E = \frac{rSP}{7.04 I}$$

in which r is the radius at which the pull is measured, S is the speed in revolutions per minute at which the dynamo is to be run, P is the pull in pounds at the given radius and I is the current in amperes. The field strength is supposed to remain the same. This method is correct whatever the efficiency of the machine may be. The electrical and magnetic losses due to the $C^2 R$ effect in armature, field current, eddy currents and hysteresis do not enter this problem. Even the mechanical losses arising from friction of bearings, brushes, etc., may be eliminated by measuring the pull plus the friction and then minus the friction, the actual pull being one-half the sum of these two results. The effect of friction may also be overcome by tapping the shaft when the measurement is made. It certainly strikes one as strange that E. M. F., which depends upon cutting lines of force, can be determined while the machine is standing still.

In electro-chemistry and electro-metallurgy quantitative relations are particularly precise. The ampere being defined as the current which deposits .00118 grammes of silver per second, the weight of any other substance is by Faraday's laws proportional simply to its chemical equivalent. This definition eliminates any error in passing from the electrical to the chemical data, or vice versa. The volt is also defined electro-chemically in terms of the E. M. F. of a Clark cell.

The author presented before the Institute, in May, 1888, a paper on "The Possibilities and Limitations of Chemical Generators of Electricity," in which the weights of materials, E. M. F. and other data were given for various voltaic combinations. Some of the figures were obtained by experiment and some by calculation. The paper also gives the E. M. F. produced by combinations of thirteen of the most important metals with chlorine,

bromine and iodine, respectively. The average difference between the calculated and tested values was less than one tenth of a volt. Even this small error is practically eliminated when the results are corrected by the equation of Helmholtz, that is, by adding the quantity

$$\pm T \frac{dE}{dT},$$

in which T is the absolute temperature and E is the E. M. F. of the cell. Since the weights of materials liberated or consumed by a given current in a given time can be definitely predetermined and the voltage due to a certain chemical combination can also be accurately calculated, almost any problem in electro-chemistry or electro-metallurgy is susceptible of being quite easily and correctly solved.

That branch of electro-chemistry and metallurgy which employs electrical heating methods is also very definite, the exact amount of heat in gramme-degrees produced by an electric current being always given by the simple expression $.24 I^2 R$, or $.24 EI$.

In support of the proposition advanced in the title of this address, I am able to produce most interesting personal testimony. Mr. Edison and Mr. Tesla have independently expressed to me their opinion that electrical knowledge had become so definite and general that almost anyone could apply it, and comparatively little opportunity was left for invention. They believed that chemistry and thermodynamics were far more uncertain and therefore offered a much better field for improvement. These views were expressed several years ago, and subsequent events have shown that they contain a great deal of truth.

In conclusion, the following quotation from the preface of Maxwell's great work on Electricity and Magnetism is appropriate. "The important applications of electro-magnetism to telegraphy have also reacted on pure science by giving a commercial value to accurate electrical measurements, and by affording to electricians the use of apparatus on a scale which greatly transcends that of an ordinary laboratory. The consequences of this demand for electrical knowledge, and of these experimental opportunities for acquiring it, have been already very great, both in stimulating the energies of advanced electricians and in diffusing among practical men a degree of accurate knowledge which is likely to conduce to the general scientific progress of the whole engineering profession." These words were written in 1873, and yet they show strong confidence in the accuracy of electrical methods and full appreciation of the close relationship between electrical science and engineering, as well as their beneficial effects upon each other. At that time the telegraph was the only practical application of electricity. What language would express Maxwell's wonder if he were alive to-day!

Enlarging the Covington & Cincinnati Suspension Bridge.

BY H. L. BRIDWELL.

While the work of enlarging and reconstructing the suspension bridge over the Ohio River, between Cincinnati and Covington, is a matter of great engineering interest, but little has been printed about it. Operations were begun in August, 1895, on the new anchorages for the two cables to be added, and since that time all of the masonry work has been finished, the new Cincinnati approach completed and the new cables spun. The latter are 1,970 ft. long, 10½ in. in diameter, and contain 2,236 steel wires each, with a combined strength of 12,000 tons. They are carried at the towers immediately above the old cables, which are 1,700 ft. long, 12½ in. diameter, and have 5,000 iron wires each, with a total strength of 8,400 tons.

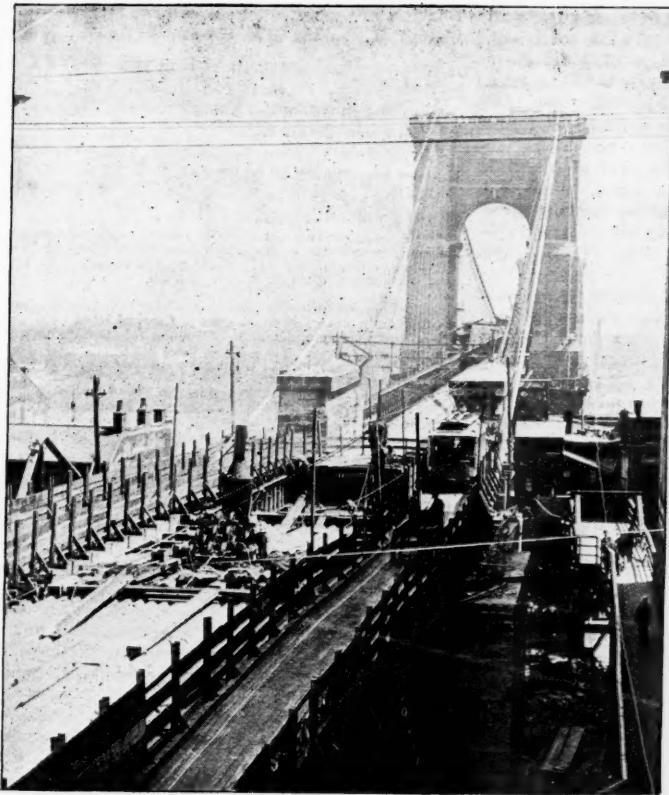
When the old cables are released they will swing in a vertical plane instead of being drawn towards each other at the middle of the span, and both pairs of cables, old and new, will be in the same plane throughout, except over the Cincinnati shore span, where the new ones spread apart to the new anchorages, set wider to accommodate the more spacious entrance approach.

This work, like Mr. Buck's famous work at Niagara, has had to be done without stopping traffic, which makes the engineering problem difficult and notable. The electric car lines across the bridge accommodate a population of more than 60,000 people, 1,200 cars daily being the estimated crossings now, as well as about 1,000 trucks and wagons and 6,000 foot passengers in the same period. No interruption of this traffic could be permitted, since street cars can reach Covington directly only by this bridge, and it is creditable to the chief engineer, Mr. Wilhelm Hildebrand, in charge of the work, that not only has this connection been kept perfectly, the only delay having occurred upon a Sunday for a few hours, when the rapid change of tracks from the temporary approach to the bridge proper was made, but also that the streets adjacent have been kept clear.

The bridge is the second largest suspension bridge in the world, and at the time of completion in 1867 was the largest, the New York and Brooklyn bridge over the East River not being built till 16 years later. The river span is 1,057 ft. long and 108 ft. above low water in the river, and was 36 ft. wide. The total length was 2,250 ft. from the Cincinnati entrance on Front street to Second street, Covington. Over \$1,800,000 was spent on the structure, which was designed by Roebling. It must be added, however, that while this bridge is the second largest it is not the second longest. The upper suspension bridge at Niagara Falls (Niagara Falls & Clifton Suspension Bridge) is 1,268 ft. center to center of towers. The versed sine of the cables of that bridge is about 92 ft., and these cables, four in number, consist each of seven 2½-in. galvanized steel ropes. The Covington & Cincinnati bridge is, however, much heavier than the Clifton bridge.

The enlarged bridge will begin at Second street, in Cincinnati, with a new stone and steel viaduct approach 67 ft. in width and 800 ft. long. A middle plate girder, two curb girders and two sidewalk girders form the longitudinal supports of this approach, resting on posts 30 ft. apart. The floor beams consist of 20-in. I beams for the roadway and 10-in. I beams for sidewalks, spaced 8 ft. apart, and covered with trough-bars on which the

track with ties and concrete filling rests. This trough-bar and concrete floor is only on the approach and not on the suspended structure, which latter will be planked. The trough-bars run longitudinally, and rest on the floor beams, spaced about 8 ft. apart. On the trough-bars is a concrete filling 11 in. thick, and on top of this concrete is a brick pavement between the car tracks.



Reconstruction of the Covington & Cincinnati Suspension Bridge.

The rails are 8 in. deep, 96 lbs. per yard, and the ties 6 in. x 7 in. x 8 ft., resting directly on the trough-bars.

The approach crosses a narrow street—Commerce—upon a plate girder span 25 ft. long, loose at one end and fast at the other. At Front street it crosses with a continuous girder over three spans, 13, 42 and 13 ft., respectively, anchored at both ends. The viaduct girders themselves are loosely supported at the end. The Water street bridge is also a plate girder loosely supported at both ends and 66 ft. long.

The main span floor will be 54 ft. wide when rebuilt, with a 30-ft. roadway carrying double street-car tracks and providing ample space for wagon traffic to be carried on without delaying the cars, and two 9-ft. walks. The two latter will be built around outside at the stone towers, which have single arches and rise 200 ft. above the river. The space between saddles remains unchanged, 50 ft. No addition has been made to the towers, except that a substantial steel bridge carries the new cables above the old saddles and cables. The new saddle rests on this steel bridge, which cannot be seen from below. The new cross girders under the floor are 36-in. plate girders, weighing 1,000 lbs. each. The longitudinal girders are six in number, four of them 25-in. I beams, and two 20-in. I beams. At the old anchorages the roadway narrows to 26 ft.

The total length of the new structure finished will be 2,755 ft. At the Covington end the alterations will be of a minor character as far as visible new work is concerned, the street level being higher than in Cincinnati. The new anchorages there are in line with the old ones, and built against them.

The raising of the entire floor of the bridge was one of the important features of the engineering problem presented. It was successfully done by introducing long bolts of U shape in the connections between the wire ropeslings and the floor beams and then turning the nuts simultaneously. The floor was thus drawn up toward the cables nearly 4 ft., a large number of men being employed to do that turning at once. Street car and other travel continued during this novel operation. The transfer of the weight of the superstructure to the new cables and final equalization of it between both pairs of cables will be easily accomplished.

The cost of the reconstruction will be about \$650,000. It is probable that all the work will be done early in the spring of next year, although a severe winter may set back the progress somewhat.

The general appearance of the bridge will be materially altered. The additional cables will give the appearance of greater massiveness both in the main span and in the shore spans, whereas before this the bridge had an airy but very graceful look. The roomy, well-paved entrance at Cincinnati is a vast improvement over the old one, and its location more convenient.

The accompanying photographic views show some of the details of the work as it appeared quite recently. Acknowledgments are due Mr. Hildebrand, Chief Engineer of the bridge, for courtesies extended in securing data.

Annual Convention of the Roadmasters' Association of America.

The fifteenth annual convention of the Roadmasters' Association of America was held at the Hotel Chamberlain, Old Point Comfort, Va., Sept. 14, 15 and 16. The first session was called to order Tuesday morning at 9:30 o'clock, with President Caffrey in the chair. In concluding his address the President made special reference to the exhibits in connection with the convention, and commended them to the close attention of the roadmasters. Nineteen new members were elected.

The following officers were unanimously elected for the ensuing year: President, Mr. A. M. Hawkins, Supt., Norfolk & Southern, Edenton, N. C.; First Vice-President, Mr. F. R. Coates, R. M., New York, New Haven & Hartford, Stamford, Conn.; Second Vice-President, Mr. J. M. Meade, Resident Engineer, Atchison, Topeka & Santa Fe, Pueblo, Col.; Secretary and Treasurer, Mr. J. B. Dickson, R. M., Chicago & Northwestern, Sterling, Ill. Mr. G. W. Merrell, R. M., Chicago, Milwaukee & St. Paul, Chicago, was re-elected a member of the Executive Committee for a term of four years.

Mr. J. M. Meade, R. E., A. T. & S. F., gave a brief address on the chemical treatment of cross ties. He showed a piece of a mountain pine tie recently removed from the main line in New Mexico, and still in good condition, which was treated by the Wellhouse chloride of

zinc process and laid in 1885. The life of untreated ties in the same section of the country was given as from three to four years. The total cost of treating ties by the Wellhouse method is 13 cents a tie, including the cost of labor and handling.

A vote of thanks was tendered Rear-Admiral Sicard, U. S. N., for his courtesy in extending to the members of the convention the privileges of the five warships anchored at Hampton Roads. Adjourned.

In the evening Mr. E. E. R. Tratman delivered an address on the subject of track.

Wednesday morning's session was called to order at 9

o'clock, with President Caffrey in the chair. In concluding his address the President made special reference to the exhibits in connection with the convention, and commended them to the close attention of the roadmasters. Nineteen new members were elected.

The function of the rail brace is to prevent the widening of the gage by transmitting through the brace to the tie a part of the lateral thrust which otherwise would pass to the outer edge of the base of the rail, and also to prevent the outward turning of the rail in consequence of its cutting into the tie. The rail brace only partially accomplishes this. The rail brace does not prevent the rail from cutting into the tie, and when this is the condition much of the wheel pressure is transmitted through the head of the rail to the brace, making it a lever with the fulcrum near the base of the rail, and when in this position the spikes which secure it to the tie offer but little resistance to the track spreading or rail turning; a fact well known to every road master. By using a properly designed tie plate the cutting of the tie may be prevented and the gage maintained without the aid of the rail brace.

The extent to which the life of the tie may be prolonged by the use of the tie plate depends upon the traffic, the kind of tie timber, and a full knowledge of the existing or governing conditions. For example, on switch leads, where the track is in constant use, it would undoubtedly out-last several tie renewals; and on bridges, where the ties are more expensive, and where the labor renewing them is considerable, they are a wise economy. Also on main track under traffic where the ties are worn by abrasion due to the wave motion of the rail, the tie plate would undoubtedly prolong the life of hard wood ties from one to three years, and soft wood from three to six years.

As smooth riding curves are desirable in practical track work as well as essential in general railroad operations, your committee believes that the use of the tieplate on hard wood ties on curves of two degrees or more, and on all joint ties on tangents and curves of less than two degrees; also on soft wood ties on tangents and light curves, a plate being on each tie, would result not only in a saving of labor and material, but in obtaining a higher standard of excellence, as next to rail, ties and ballast the tieplate is indispensable in securing good gage line and surface.

In addition to the saving, 1st, in rail, by reducing to a minimum the wear due to impacts and the uneven wear due to the rail getting out of position; and 2d, in spikes, by fewer being cut by the vertical and lateral movement of the rail; and 3d, in ties, by preventing the rail from cutting into them, and by less spiking to rectify the gage, thus prolonging their life and reducing the yearly renewals, which itself, your committee thinks, would warrant the favorable consideration of the plate, the advantage to be obtained by the use of the plate are better surface and gage; the maintaining the rail in its normal position, enabling the motive power to be used more efficiently; the decreased wear and tear of rolling stock, and the generally economical operation not only in the movement of freight, but also in safety to passengers.

An essential feature of the tieplate is, that it should



Reconstruction of the Covington & Cincinnati Suspension Bridge.

o'clock. Reports of committees on "Tie Plates, the Benefits and Results Obtained from their Use," E. E. Stone, B. & A. R. R., Chairman, and "Track Joints, Results from Use of Various Devices," C. E. Jones, C. B. & Q. R. R., Chairman, were read and discussed. Abstracts of papers follow.

TIE PLATES.

The result of observation and experience with the tie plate is, that when properly designed it is superior to the rail brace, in not only performing the function of the

have perfect mechanical union with the tie to prevent vertical and lateral movement, which would result in the working loose of the plate and widening of the gage or spreading of the track. . . . And in order to obtain the best results from the tieplate, it should be properly applied, the tie being well added to an even bearing for the plate, so as to decrease the tendency for it to buckle. It should be imbedded in the tie when applied and not left for the train to settle to position, thus exposing it to the liability of sand and

gravel to get under to bend it. It should be so punched as to secure a snug fit to avoid any lateral movement of the rail, and the spikes should be driven vertically.

This committee consisted of Messrs. E. E. Stone, J. A. Dodson, J. C. Hechler, D. H. Lovell, Geo. M. Brown, Reuben P. Collins.

LATEST IMPROVEMENTS IN SWITCHES AND FROGS.

Within 15 years, spring frogs have almost entirely taken the place of rigid frogs for main lines. Of the various designs there is but little difference in the main points of construction. The placing of $\frac{1}{2}$ -in. steel plates on every tie, under the full length of the frog, to prevent the wing rails from cutting in, anti-traveler devices, sufficient holding-down pockets for wing rails, steel raising blocks, steel or malleable iron spring covers, reinforcing bars or rails on the movable wing rails, channeling wing rails to accommodate worn ties, are some of the essential points and recent improvements in an ordinary spring frog.

All steel used in the construction of frogs and switches should be of the best quality, with an ultimate tensile strength of not less than 50,000 lbs. per square inch. The rails should be bent cold and in the arc of circles and not angular. The planing should be true and all abutting surfaces should fit closely. They should have coped joints and the cutting in of the main point rail should be $\frac{1}{2}$ in. The base of the long point should be cut out, but the short point should be fitted over the long point by careful and proper planing. Point rails should be securely riveted with not less than $\frac{1}{2}$ -in. rivets. The bend in the wing rails at the point should be in the arc of a circle. Drilling for all bolts in spring rail frogs should be on a line perpendicular to the main track rail. The fixed wing rail and point should be bolted together with a sufficient number of 1-in. bolts to make the frog rigid and durable. The movable wing rail to be bent so as to fit closely against the point rail from the beginning of the flare to within 8 in. of the working point. Reinforcing bars of suitable dimension, with proper holding-down plungers perpendicular to the bar, and a suitable number of stops riveted on to the base plates to allow an opening of 2 in. between the wing rail and working point. Springs of various designs are used, and the location is a matter of choice. Fillers, solid and continuous, should be used and planed to closely fit the rail section. The drilling for all bolts should not be more than 1.32 of an inch larger than the bolt to be used. Steel raising blocks should be placed at the heel of the frog with a firm bearing upon the bottom flange of the point rail and securely bolted. The line and surface should be true, and no paint or other covering should be used until after the frogs have been inspected and received.

The sliding spring frog, which is a recent design, and may be used either for main line or yard tracks, may be classed as a late improvement. Its principal feature seems to be its simplicity. The advantage over an ordinary spring frog is the changing position of the wing rails according to the direction of the train, thus reducing pounding. It renders full bearing at the working point in either direction of the train, thus reducing the wear to the wing rail.

Another line of improvement in the frog device is the continuous rail connection.

There has been but little advancement in the way of improvements to rigid frogs of recent date. A rigid frog should be so constructed as to render it rigid in the fullest sense of the term. With inferior fastenings the frog soon becomes loose, which results in the battering down of the wing rail at the working point, and if not given constant care and attention when traffic is heavy, it soon goes to pieces, finds its way to the scrap pile and another frog is called for. Bolted frogs should have coped joints, the same as described in the spring frog. The drilling for all bolts should be perpendicular to the axis of the frog and supported in some approved way. The frog plates should be $\frac{3}{4}$ to 1 in. thick to properly protect the frog. The flared end of the wing rails should be bent on an angle of 1 in 8, with the flared end not less than 4 in. from the gage line. Bolts from 1 to $1\frac{1}{2}$ in. diameter with some approved spring nut lock should be used, and should be supplied with beveled iron washers so that the bolt heads and nuts will have a firm bearing.

In clamped frogs the vertical clamp gives the best results in many ways. . . . The objectionable feature, however, is the clamps coming in contact with the switch timbers in complicated yards, and this criticism can justly be applied to all class of frogs where the clamps or fastenings come below the frog base.

The Tyler & Ellis Hydraulic Pressed Frog is something new in the states. It was designed some years ago by Mr. Price Williams. . . . The advantages in this frog over other forms are as follows: Absolute continuity of track. There is no break in the main track, as the rail is heated and grooved or the flangeway pressed into the head by hydraulic machinery. The metal so displaced goes into the web to strengthen it, no metal being cut away. The base is left intact and renders stronger construction than an ordinary rail. This construction also allows better alignment and surface.

The construction of the modern type of the Clark-Jeffery switch is now almost the same as made by the various makers. The new features are, however, to be constantly found in the tie-bars and the connections with the switch stand. The early practice inclined to a pair of point rails 15 ft. long, tied together by four or five rods. The most recent practice is doing away with many tie-rods, and reinforcing the switch rails. This

decreases the liability of fracture of the rail, which if broken is held together by the wrought-iron reinforcements. Where but one rod is used (commonly called "head rod"), the device for taking up the lost motion due to wear has earned the name of "adjustable head rod." A turnbuckle is used by some manufacturers, while others use a "key-wedge adjustment."

There is a difference of opinion as to the respective merits of the various devices for adjusting the split switch so that it will fit snugly against the stock rail. A snug fit is desirable, and is not disputed, but it is held by some that a turnbuckle is very likely to be tampered with by persons maliciously inclined, which may give room for criticism, but possibly this could be overcome by an improved or secret nut lock.

Split switches, recently adopted by some of the trunk lines and exclusively used, are, in a sense, constructed quite the reverse from single-rod switches, with reference to the switch rods; the tendency being rather to increase the number of rods, as noted by the following specifications:

60 and 70-lb. rail—18 ft. points have five rods;
80 and 85-lb. rail—24 ft. points have six rods;
100-lb. rail, 24 ft. points, and seven rods, 4 ft. 9 in. gage of track, switch rods $\frac{3}{4}$ in. thick and 2 in. wide.

Of the reinforcing bars, as recently applied to the split switch, of which there are several designs, those bolted to the outside of the switch rail are said to give the best results. They are made to closely fit the rail section and extend from the switch point to within 3 ft. of the heel. . . . This committee consists of Messrs. W. J. Prindle, H. D. Hanover, W. H. Mantz and H. G. Hetzler.

RAIL JOINTS.

Your committee, which was designated to report on the subject of Rail Joints, concluded that it would not try to show the good or bad qualities of any of the joint appliances of recent invention, but make the issue alone on the practically universal joint now in use—the Angle Bar—and, by showing the inefficiency of the angle bar as compared to the rail, to show why there should be a better appliance furnished, if we are to keep the track smooth.

Your committee has been impressed with the fact that no satisfactory solution has been reached of the problem presented by the rail joint; and also the dearth of information of such a nature as to be of practical value in making up this report. Perhaps the most painstaking and exhaustive treatment of the subject is that of the Association of Engineers of Maintenance of Way, of the Pennsylvania lines, West of Pittsburgh, Mr. J. C. Bland, Chairman. The discussion is in pamphlet form and is a practical mathematical demonstration of the relative values of the various manners in which angle bars are used, and the stresses to which they are subjected. Your committee's report is practically a digest of this report, and we commend it to your notice.

The experiments were upon and the deductions made from the Pennsylvania Railroad pattern 85-lb. rail, and from it we gather that the capacity of a pair of angle bars in conjunction with the rail which they unite is much below that of the rail, and that the capacity of the angle bar as a supported joint (either one or three ties) is below that of a suspended joint. So, leaving out entirely the supported joints, we reach the following conclusions, most favorable to the angle bar:

First, That in normal bending action, that is, under quiescent loading, the bars are deficient in compressive resistance; and, therefore, the compressive elastic resistance, which is only 68.6 per cent. of the ultimate resistance, will govern the life of the bars.

Second, That the proportion of the loading on the angle bars and the rail which they unite will be as their respective stiffnesses, and that with the loading over the joint, the angle bars have to carry from 53 to 56 per cent. of the full load on the joint.

The static capacity of the Pennsylvania Railroad 85-lb. bars in conjunction with the rail is 72,400 lbs. repeated indefinitely. The capacity to resist frequently applied, off-repeated loads, is 36,200 lbs. The capacity to resist suddenly applied, off-repeated loads, with reversal of stress is 18,100 lbs. Thus, the 85-lb. angle bars, in conjunction with the rail, have a capacity to resist suddenly applied loads ranging from 36,200 lbs. to 18,100 lbs. Between these limits lies its strength.

The capacity of a pair of 85-lb. angle bars in conjunction with the rail being 36,200 lbs., and under the same conditions of loading, that of the unbroken 85-lb. rail being 68,700 lbs., the efficiency of the No. 85 angle bar joint is 52.4 per cent. Or, in other words, though the bar has more than half the work to do, it is, from its construction, only a little more than one-half as well able to do it.

Therefore, though at the joint the bars have to carry from 53 to 56 per cent. of the full load at that point, they are in conjunction with the rail only 52.4 per cent. as efficient as the unbroken rail.

As to the cost of the maintenance of the angle bar joint, it is exceedingly difficult, from the nature of the work, and from our method of time-keeping, to arrive at an exact figure as to the amount directly chargeable to this, but from the best data obtainable, the amount lies between 20 and 30 per cent. of the total labor account of all section forces.

It is manifest that it is not to be expected that we can keep up the joint with the present angle bar, and we ask any and all those having joint appliances to show by actual tests and mathematical demonstration that they have a better joint than the angle bar.

Recognizing the broadness of the field, and the good results that have been secured through discussion by this body, your committee suggests that the American Society of Civil Engineers, to whom we are indebted for the standard sections of steel rail, be respectfully requested to take up and consider what form of rail fasten-

ing is necessary at this time to provide for the increased weight of cars and engines, and the fast speeds now necessary to secure profitable financial results for the railroad company, and let us have the benefit of their experiments, we giving them the assurance that if they will undertake it, every assistance in our power will be rendered.

This committee consists of Messrs. C. E. Jones, M. Burk, A. S. Lippert, P. Rockwell, S. B. Bodwell, C. B. Lentell, M. Riddle, G. M. Brown, W. A. Hill.

IS IT MORE ECONOMICAL TO PUT IN TIES OUT OF A FACE OR IN PATCHES?

"Putting in ties out of a face" means to replace every tie in a given distance.

"In patches" implies putting in new ties here and there where they may be needed.

The conditions to be looked into in considering this subject may be divided as follows:

1st. All timber ties are of two general classes: Hewn and sawed; these in turn may be subdivided as follows: Hewn—(a) quarter tie, (b) slab tie, (c) half tie, (d) uneven tie, (e) pole tie. Sawed—(a) quarter tie, (b) slab tie, (c) half tie, (d) pole tie.

2d. The wood entering into ties is of great variety, ranging from cedar and other soft woods to lignum vitae.

3d. The density or hardness of wood of the same species varies greatly.

4th. The dimensions of ties vary; this is especially so in regard to width of face.

5th. There is great difference in the life of ties.

6th. The amount of labor expended in handling and renewing ties.

When ties are put in in patches, the track is torn up at different places, which necessitates, temporarily, hard and soft spots. The tie supports are not equal, being of different size and age. Only those ties which are worn out will be removed, and the old ties remaining keep the track to line.

By renewing ties out of a face, every one, be it good or bad, partly worn or otherwise, must be removed. The track will be rough only on the stretch which is being renewed, as the bed will be disturbed, thus impairing the surface and line, and it will require the expenditure of considerable labor to put this track in its former riding condition.

To attain the theoretical results from this method of renewal would be necessary, for the first five conditions previously mentioned, to agree in the ties. In other words, each tie is an exact counterpart of the one next to it.

The question arises as to the method of disposing of the partly worn ties. As all new ties are used in the renewals of the main line tracks, the partly worn ties must necessarily go into the side tracks. We have a tie which in some instances will last two years if not disturbed; it is taken out of the main line and placed in the side track, where owing to its having been rehandled its life is somewhat impaired, and though there is less running over it, it will not last much longer than it would have in the former place.

Assume a first-class tie to cost 40 cents and a second 20. The labor necessary to renew a tie in stone ballast will amount to about 15 cents, and in gravel about 10; this includes removing the old tie, putting in the new one, and tamping once. The life of a tie is taken at seven years. As previously stated, in renewing out of a face we will consider a tie (and there are many of them), which if not disturbed would have lasted two more years. The cost of this tie per year is 5 $\frac{1}{2}$ cents. To remove it will cost one fourth of 10 (for gravel) or 2 $\frac{1}{2}$ cents. The cost of labor necessary to replace it in the side track is 10 cents. Then, not considering the cost of handling, we have

Cost of tie at 5 $\frac{1}{2}$ cents per year for two years is..	11 $\frac{1}{2}$ cents.
Cost of removal.....	2 $\frac{1}{2}$ cents.
Cost of renewal.....	10 cents.

Total.....	24 cents.
A new second-class tie, which would last seven years, would cost.....	20 cents.
Cost of renewal.....	10 cents.

Total.....	30 cents.
------------	-----------

In the former case the cost per year for side track is about 12 cents, in the latter 4 $\frac{1}{2}$ cents. Hence, from this standpoint no saving is effected.

Also can be mentioned the financial loss occasioned by removing a tie from the main line before its efficiency is exhausted. Assuming that a first-class tie costs 40 cents, at 5 per cent. the loss is 2 cents per year, or in the two years 4 cents.

The object of all trackmen is to have the tie supports so placed as to give the best distribution to the passing wheel loads. Considering the statements made in regard to timber ties, and under the present conditions, the theoretical is never attained. To reach this point would mean the rejection of a vast number of ties that are now accepted, and as this condition is one of the strongest points in favor of renewing ties out of a face, and as previously shown it is never attained, the committee is of the opinion, in view of this fact, also for the safe keeping of the tracks and in the interest of economy, that ties should be renewed in patches. Of course there are exceptions to every rule. Where renewing is done under adverse circumstances, such as in tunnels, under road crossings, station platforms, etc., they should be put in out of a face.

This committee consists of Messrs. F. R. Coates, T. Hickey, E. H. Bryant, J. A. Taylor, W. H. Courtney, M. J. Greeney, P. Madden.

BEST METHOD OF DIRECTING AND SUPERVISING THE WORK OF SECTION FOREMEN.

A paper by H. W. Church, R. M., L. S. & M. S.

Maintenance of way may properly be divided under two heads. One covering renewal of rails and ballast and extensive fence construction, which come under the

Proposed Signals at Passaic River Drawbridge, West Arlington, N. J.*

The location of this draw is at the foot of descending grades in both directions, averaging 58 ft. to the mile. A through cut in rock begins immediately east of the road crossing east of West Arlington station, and consequently the station at West Arlington cannot be moved eastward without heavy rock excavation. This station is a flag station and consequently few trains stop there; at the same time it is necessary to so arrange the signals and interlocking that trains may stop at this station while the draw is open and at the same time provide the maximum degree of safety. Mr. Charles Hansel discusses the subject somewhat in detail. He says:

The question naturally arises as to the practicability of introducing derails. We believe that they are not only practical, but essential, as being the lesser evil of the two, for the bridge being at a considerable height above the Passaic River there is no doubt that there would be greater loss of life and property by precipitating a train into the open draw than by derailing it at a considerable distance from the draw, and if the signals are located at a sufficient distance in advance of the derail, and the whole apparatus properly protected by electric locking, there seems to be no reason why the drawbridge cannot be fully protected without delaying traffic more than it is now delayed by the necessities of navigation.

In the scheme which we propose trains approaching the draw from the west will find a distant signal located 2,100 ft. from the end of shore span and 2,300 ft. from the end of the draw. In connection with this distant signal we provide a short track circuit which causes a gong to ring on the distant signal when that signal has been passed at danger.

The next signal is the home signal, located 1,200 ft. beyond the distant signal, or 900 ft. from the shore span of the bridge. It will also be noted that this home signal is 450 ft. from the derail. This would not be practical were it not that we control the derail by electric locking. This home signal will be operated by pipe connection and will be co-active with a torpedo signal placed at the same point. Considering the descending grade, it is thought desirable to place this home signal considerably back of the derail and use the audible torpedo signal with it so as to give an engineman every

to be operated. At the east end of the bridge an advance signal is located. This signal remains at danger and cannot be cleared so long as the draw is unlocked.

Immediately in the rear of the permissive home signal is a short section of track circuit, the purpose of which is to unlock lever No. 9 in order that the derail No. 7 may be closed. The electric locking for this work will be accomplished by electric locks on the tappets of levers 8, 9 and 11.

The electric locking on derail No. 11 is applied so that after the signal No. 15 is cleared the derail No. 11 cannot be opened until the train has passed over the drawbridge. This is accomplished through a circuit on the draw.

In approaching the bridge from the east end, when the drawbridge is open and when it is desired to bring the train to the station in order to discharge or take on passengers, the operation will be as follows: The arrival of a train at the permissive home signal is announced to the operator in the tower by two blasts of the locomotive whistle or by a bell in the signal tower actuated by the presence of a train on this circuit; and the presence of the locomotive on the short circuit will release No. 9 so that the operator may now close that derail, although the bridge remains open. He cannot close this, however, until the locomotive is on this section; and should the engineman not have brought his train to a stop he will indicate same by exploding the torpedo, which is immediately beyond the section. After the train has stopped and called for permission to reach the station, the operator may lower the red arm by reversing lever No. 2, leaving the green arm in a horizontal position. This signal authorizes the engineman to move forward to the station, where he is confronted by signal No. 4 at danger so long as the drawbridge is unlocked. As soon as the drawbridge is closed and locked, No. 4 may be cleared and the train proceed.

The object of having the permissive home signal is that when the red arm only is lowered it is an indication to the engineman that the bridge is unlocked, but that he may proceed to signal No. 4. By this means he has definite information when he begins to move his train forward, after first having come to a full stop and if the bridge is closed and both arms are cleared, he understands that he may proceed at full speed. If the engineman finds the permissive home signal against him and has no passengers to discharge, he will naturally not call on the signal man to give him the permissive signal,

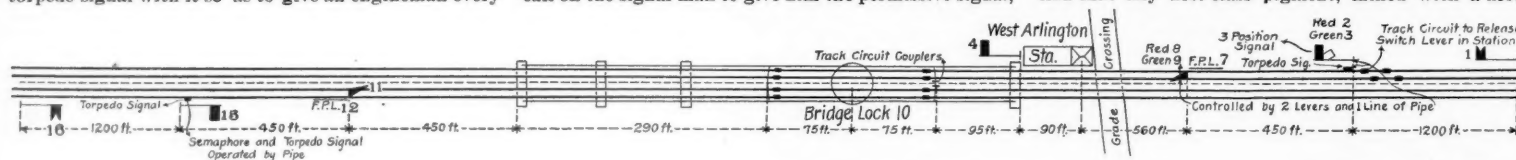
ability. And yet one stubborn fact remains, which science has failed to remove, and that is, that since there are no anti-rust paints the rust and mill scale must first be removed before painting otherwise the result will be unsatisfactory. A mere brushing of the surface with wire brushes will not suffice; but every particle of rust must first be extracted from the pores of the metal before painting, or bad results are sure to follow. Therefore, with the aid of the foregoing facts, coupled with practical experience in dealing with rust and scale, which constitute the basis of metal painting properties, I should say that a good absorbent mineral pigment mixed with pure boiled oil for a primer, and a non-absorbent and unchangeable pigment, such as graphite, mixed with equal parts of raw linseed oil and boiled oil, would constitute a protective covering for metal which, for use under such circumstances as usually obtain in general practice, would produce result as satisfactory as reasonably could be expected.

In view of the fact that this question had been referred to the Association for consideration and report by the Master Car Builders' Association, a thorough discussion ensued.

MR. BALL (P. R. R.) referred to a severe exposure of samples extending over 15 months, the samples painted being: Red lead, small amount of litharge, sufficient to dry fast, and raw linseed oil; another sample, straight red lead and linseed oil, without drier; another, red lead and one-half lampblack; another, red lead and three-quarters lampblack; another, mineral metallic paint, red oxide of iron; and last sample, graphite, called Mexican graphite. All except first were mixed simply with raw linseed oil without any drier. After the exposure the red lead and litharge coating had given way in two or three spots; the red lead straight was intact, good for several years to come. The mixture of half red lead and half lampblack had several places scaled off, showing rust. The red lead and three parts lampblack was in still worse condition. The oxide of iron was completely gone. The graphite was perfect, the same as the red lead straight. All samples done at the same time, same quantities of oil, same exposure.

MR. PUTZ (B. & O. S. W.) painted last year two samples with graphite and red lead; samples are now as good as when painted.

MR. GOHEN moved that it is the sense of this association that any first-class pigment, mixed with a first-



Proposed Arrangement of Signals for Drawbridge at West Arlington, N. J.

opportunity of avoiding derailment should he pass the home signal when the derail is opened. The derail is placed 450 ft. from the end of the shore span on account of the descending grade.

Going now to the drawbridge, which is operated by manual power, being but 150 ft. long, it is proposed to operate the pipe couplers by a two-lever ground stand in the center of the draw, operated by the bridge tender. This two-lever ground stand is so interlocked with the mechanism in the tower at the station as to require all signals to be set at danger and the bridge unlocked before the bridge tender can commence to unhook couplers. Westbound trains may be required to stop at the station immediately east of the east shore span, and the navigation laws will not permit of a train holding the draw closed. Some special arrangement of signals and derails must therefore be provided in order to accommodate this situation.

The east distant signal is placed in the same relative position to the draw as that for eastbound trains, and is also accompanied by track circuit and gong, which is sounded only when distant signal is at danger and train is passing it. The home signal will have two blades pivoted on a common spindle (the design described in the *Railroad Gazette*, Dec. 11, 1896).

The signal will be controlled by two levers in the interlocking machine acting on a single line of connections in such manner that the movement of one lever lowers both blades, showing a clear signal, while the movement of the other lever lowers but one blade, leaving the other blade in a horizontal position, showing red and green blades by day and red and green lights by night. The torpedo signal at this point places a torpedo to be exploded by the passing train only when both arms are in a horizontal position. This is accomplished through a special device, which is made necessary by the fact that the signal is operated with only one line of connections which gives a positive or permissive signal, as desired. Since we should not place a torpedo for explosion when the permissive signal is given, it will be understood that this problem was somewhat difficult to solve. The same movement will be used as was designed and is now in service on all the torpedoes which are placed at every home signal on the Harlem line, New York City.

Since the derail must be closed in order to permit a train to reach the station, even though the bridge is opened, we propose to operate the derail by two levers operated by a single line of connections in a similar manner to that by which the permissive home signal is

which would permit him to go forward to the station. If, however, the agent has passengers for that train he can call the train on by giving the permissive signal, although the engineman has not asked for it. This will indicate at once to the engineman that there are passengers for him and will prevent unnecessary delays.

Since it is not necessary to keep the derails open at all times when the track is not occupied by the train, as in the case of a grade crossing where there is no electric locking and where there are opposing routes, there is no danger of a train being derailed unnecessarily; that is, when the draw is closed.

It will be noted that westbound trains are not at all times absolutely protected from going into an open draw; we believe, however, that a high degree of safety is secured, from the fact that we do not permit them to pull up to the station until they have first come to a stop at the home signal; they have had warning at that point that they must stop at the station, and so long as the advance signal is set against them they must not proceed. This plan can be enlarged by adding a second derail at the advance signal; and since the train would not acquire momentum between the point it stopped at for the station and the advance signal, we think it would be absolutely safe to put in a derail at that point. Should the engineer carelessly open the throttle the engine would not make a turn of its wheels before it would be on the ties. We believe, however, that this is not essential under the conditions and plan described.

Master Car and Locomotive Painters' Association.

The twenty-eighth annual meeting of the Master Car and Locomotive Painters' Association was held at the Hygeia Hotel, Old Point Comfort, Va., Sept. 8, 9 and 10.

The first report was on "Protective Paint for Metal Parts of Cars and Trucks." Mr. J. H. Pitard (M. & O. R. R.), a member of the committee, in writing upon this subject, says: There are no anti-rust paints; the virtue of the protective coverings rests entirely with the binding material, and in which case the oil or varnish that is non-porous and forms the most impervious coating in order to thoroughly exclude the moisture and atmosphere will prove the most effective covering for metal. The question of a pigment is of secondary consideration. The preference is accorded to those of low specific gravity and not susceptible to atmospheric influences, some of which (as graphite, which does not absorb the oil or binding material) are better for some purposes (as the finishing coat), but some pigment such as a mineral paint, that does absorb oil, would be preferable as a primer, as in that case the drying is greatly facilitated, which condition is essential to dura-

class quality of linseed oil, properly applied and cared for, will answer all purposes for all metallic parts of cars or locomotives, or structural iron, which it is proper to paint with an oil paint. This motion was unanimously adopted.

The next paper was on "What methods of surfacing will give fairly good results without the use of either sandpaper or lump pumice stone for passenger cars or locomotive tenders?"

MR. CHAS. KOONS (Laclede Car Co.) in his paper said: First prime, as usual, with this exception: Mix priming a little heavy and instead of flowing it on the panel, give a thorough working in with the brush, so as to get the priming well brushed into the pores and also to lay the fibrous nature of the wood that usually sticks up when not thoroughly worked down. This can be helped along a great deal by using a piece of heavy sole leather, trimmed off and smoothed so as to make a smooth, even finish when drawn across the panel, as you would a plaster or putty knife, when plastering open porous woods. This must be carefully done in the next coat mixed a little heavier than the priming, and so on, right through all the coatings up to the putty. In mixing the putty it should be ground so fine that in spreading it over the panel there will be no brush marks or breaks of any kind, as this must answer for all the surfacer. The same leather can be used in manipulating the putty as in the other coats, only greater care must be taken in handling it, as this finish is final and must answer for the full surface. The putty knife should also be used to help smooth the putty. When this is dry the work is ready for the color, which should be laid on as smoothly as it is possible to lay a coat of japan color.

If this is properly done a perfect surface will be the result. Two coats of color flowed on as above are sufficient. One good heavy coat of rubbing varnish is now necessary, after which a close rub with ground pumice and water will fit the surface for finishing. Probably two coats will suffice for a good serviceable job. If not, give it three, as there is nothing said in the subject about a limited number of coats, and in order to gain the desired end give as many as you like—only be careful to cut off the sandpaper and lump pumice.

In the paper by J. H. Kahler (Erie R. R.) on the next subject, "Painting Railroad Equipment with Compressed Air," he said: A great deal of fault is found in the working of different machines, owing to the spray produced filling the atmosphere with a light floating mist through the shop when working indoors, but with a properly constructed device, the paint formulated right, and sprayed with the proper pressure of air, this trouble is reduced to a minimum. For rough re-

* Scheme presented at the Railway Signaling Club, New York City, Sept. 14, by Charles Hansel, General Manager of the National Switch & Signal Co.

paired freight cars, the spray painting surpasses the brush, as the paint is blown into all bruises and roughness of surface, without the usual amount of brushing by the old way; far better work, with less material, is the result, as here is where the method excels. Paint spraying has proved a success in doing freight cars, by reducing time in shop and cost of brushes; cars can be got into service quicker than by the old way with the brush, which is a gain to the railroad companies when

canvas is concerned, can do but little harm. After allowing the canvas to set as long as possible and priming to harden we continue with the lead and oil; thus we give a new roof five coats as follows:

- 1st. One coat of thick lead and whitening.
- 2d. One coat of canvas.
- 3d. One coat of priming—lead and oil mixed thin, with slight dash of turpentine sufficient to cut the oil so that it will readily strike through the canvas.
- 4th and 5th. Two good coats of lead and oil paint, not forgetting a little turpentine in each coat.

shovels, the parts being heavier, there is not so much liability of important parts breaking, thus necessitating extensive delays and repairs. The 60-ton shovel carries a dipper of $2\frac{1}{2}$ cu. yds. capacity, struck measure, and in soft material will carry a 3-yard dipper. This machine is designed to dig 4 ft. below the rail on which it stands and to have a clear height of 14 ft. from the rail to the under side of the door when the dipper is open in the highest position. With this shovel a cut 56 ft. wide can

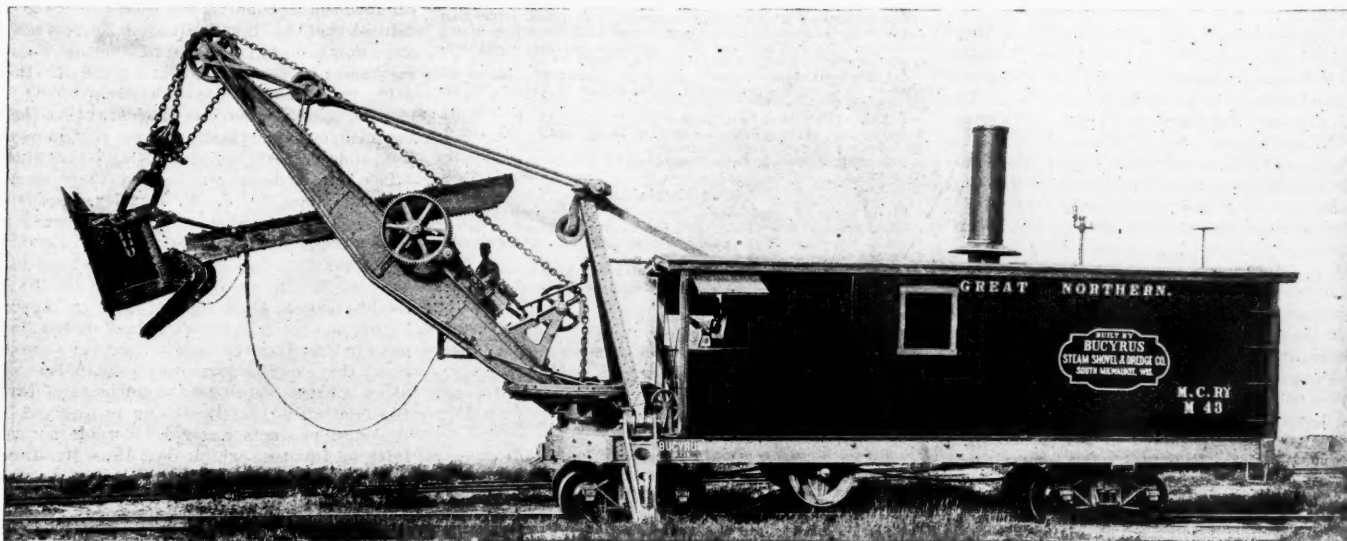


Fig. 1.—Sixty-ton Steam Shovel—The Bucyrus Co.

the cars are in demand; it also proves an incentive to more cars being repainted, owing to the fact of the time out of service being reduced, thereby placing the rolling stock into better and much needed appearance, a fact that we are all well aware of, as regards a goodly number of certain classes of cars.

The next subject discussed, "The Cleaning of Passenger Cars and Engines at Terminals," excited much discussion. Mr. Thomas Byrne (C. & O. R. R.) in his paper said: "For cleaning our passenger equipment at the Richmond terminal we use a force of 20 employees, eight of whom look after the inside and 12 after the outside of the cars. They also ice and water the cars, cleaning all brass work inside and out, attending to the bedding and all interior belongings of the Pullman sleepers running and stopping here, and are required to keep the premises or coach yard clean and presentable at all times. We clean on an average 24 cars per day. Of these only four are cleaned daily with an oil soap which we use; the others are carefully wiped off with clean cotton waste and present usually a very neat appearance, and then the next day four of those that were wiped on a preceding day are cleaned with the oil soap, and this is continued alternately, so that at all times our equipment is looking fairly well. I have found in my experience in this matter that the best person to manage the cleaners and look after the condition of the cars is a good practical painter, one who feels a pride in his business and is capable of managing. Another very important adjunct in the cleaning of cars at this terminal is compressed air, which we use on the interior of our cars, and find it wonderfully effective. We also use the oil soap sparingly to brighten up and renovate the head-ings and other interior wood work, and when carefully done it is a decided improvement upon the ancient system of dusting and wiping. The oil soap which we use is a manufactured article, and is applied with a piece of cotton waste thoroughly saturated with it. The work to which it is applied is fairly well rubbed, and is immediately wiped off with a clean piece of cotton waste, care being taken at all times to remove all traces of the soap. If properly done all stains, accumulations of smoke and other imperfections are removed from the body of the car, leaving it as though it had just come out of the paint shop. Our engines and tenders are treated in the same manner that our passenger equipment is, but not so frequently, and present a decided improvement when so treated."

In the discussion Mr. Byrne stated that average cost of cleaning each car was \$1.20.

Mr. GOHEN offered the following:

Resolved.—That it is the sense of this Association that it would be economy for all railroads to regularly and thoroughly clean all its passenger equipment, cars and locomotives, at stated intervals, with some good neutral cleaner, other than soap and water, and that this cleaning be put under the immediate supervision of the master painter of the road. Unanimously adopted.

In the paper on the "Best Method of Painting a Canvas Roof," Mr. H. L. Libby (West End Ry., Boston) said: "It is claimed by many that linseed oil has a tendency to rot the canvas, and that it should be well sized before the oil is applied. Possibly, this is so, but it has been my practice to have the canvas set in a thick bedding composed of two-thirds lead to one-third whitening, thus forming a cement which unites the canvas so closely to the roof boards as to become part of the same. We then prime the outside or top with an oil and lead primer. Thus we have the lead before it and lead behind it, and any decay that may take place, so far as the

With this process we have never been troubled with canvas rotting, and if it should I fail to see how it could get away. We have had old cars come to the shop to be broken up after many years of faithful service, and the canvas has been stripped off with much difficulty, and sold or given to the boys to take home to cover the roof of a hen house or some other building, there to give service for an indefinite period.

The following are the newly elected officers: President, Charles E. Copp (B. & M. R. R.); First Vice-President, H. G. McMaster (Ill. Cent.); Second Vice-President, J. T. McCracken (Jackson & Sharp Co.); Secretary and Treasurer, Robert McKeon (Erie R. R.). The vote for the next meeting place was: St. Paul, 41; Montreal, 40.

The following supply houses were represented at the meeting: Moses, Bigelow & Co., Newark, N. J.; Berry Brothers, Baltimore; Chicago Varnish Co., Chicago; Chandler & Co., New York; Chilton Manufacturing Co., New York; Detroit White Lead Works, Detroit; F. W. Devoe & Co., T. Reynolds Co., New York; William Harland & Son, New York; Hildreth Varnish Co., New York; N. Z. Graves & Co., Philadelphia; J. L. McCloskey & Co., Philadelphia; Murphy Varnish Co., Newark; Patterson-Sergeant Co., Cleveland; Thresher & Co., Dayton; Valentine & Co., New York; Robert Ingham, Clark & Co., New York; Valenine & Co., New York.

A Sixty-Ton Steam Shovel.

The illustrations show one of eight 60-ton steam shovels recently made by the Bucyrus Company of South Milwaukee, Wis. Four of these shovels were

be made. The framing and all working parts are proportioned to safely withstand stresses due to encountering immovable materials when the engine throttle is fully open and the pressure of steam back of the piston is 100 lbs. per square inch.

The car is 37 ft. 6 in. long by 10 ft. wide, and the underframe is built up of 15-in. steel I-beams of heavy section, to which the machinery and framing are directly secured. The boom is suspended from an A-frame of 8-in. steel channels and plates, with cast-steel head and base extending across the entire front of the car. This A-frame, in connection with a single heavy back-guy, constitutes a rigid tripod, in which the stresses are all directly provided for by pin-connections of large size. The house enclosing the machinery is entirely independent of this frame, and is simply a substantial freight-car construction for enclosing the working parts. The A frame for the shovel shown is 17 ft. 6 in. clear height from the rail, as the overhead clearance limit on the Great Northern is 18 ft. The jack-arms are of forged steel, connected by pins to the top and bottom members of a transverse truss extending over the forward truck center in such a way that the jack-arms form a combination of trusses. In this way the thrust or bearing of the A-frame is carried directly to the jack-arms without straining the body of the car.

The boom is made up of double steel plate girders, the lower flanges of which are formed of steel I-beams placed with the webs horizontal. The object of this

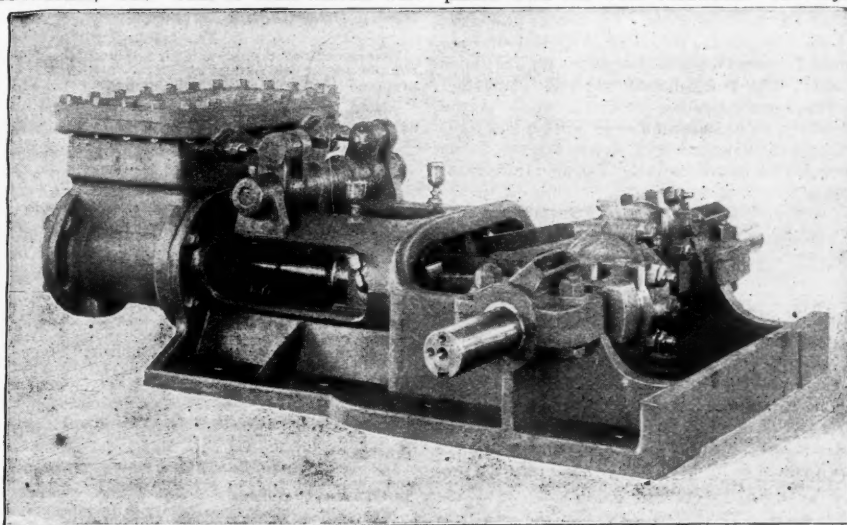


Fig. 2.—Thrusting Engines for 60-Ton Steam Shovel.

built for the Great Northern Railway and four for the Lehigh Construction Co., Ltd.

The shovel shown by Fig. 1 was designed to meet the demand for increased size and capacity, which is now required in all branches of railroad equipment. Until recently railroads have used machines weighing from 35 to 45 tons which handled dippers of $1\frac{1}{2}$ cu. yds. capacity. A shovel of this size will do effective work under all ordinary conditions, and in a favorable bank will load flat cars at the rate of 200 cu. yds. an hour. In hard material and under unfavorable circumstances, however, such a shovel is not so effective, and the machine illustrated was designed to give an increased output in both heavy and light material. In the larger steam

construction is to provide lateral stiffness in the lower member of the boom which carries the load arising from rapid swinging. These machines, we are told, can be worked continuously at four to five dipper loads per minute under favorable conditions. The swinging friction clutches used are of a special type that give easy control of the boom, while they do not heat during continuous working. The swinging is done by means of wire rope which gives a smooth and easy motion.

The dipper is of steel, with the shell formed from one piece $\frac{1}{2}$ in. thick. The dipper is attached to the handle by the improved fastenings used by the Bucyrus Company, which do away with the old fashioned forged side arms. The dipper handle is of oak and steel and all it

adjustments are the same as are used by this company for large lake dredges.

All gears and pinions throughout the machine are of cast steel, and all parts that run loose on shafts have bronze bushings. The hoisting friction is of the outside band type, lined with wood blocks and adjusted by means of one nut. The hoisting chain is $1\frac{1}{4}$ in. and all the sheaves are 30 in. in diameter made of cast steel. The boiler is of the locomotive type, 54 in. diameter, with 2 in. tubes, and designed for a working pressure of 125 lbs. per sq. in.

The main engines have double cylinders 10 in. x 15 in. The frame is directly connected to the I-beams, forming the car underframe, without the intervention of wood, which would be liable to decay and work loose. The guides are cast with the frame, and bored. The crossheads are of cast iron and consist of one piece, and no adjustment of any kind is provided. The bearing surfaces of the crossheads of these engines are made equal to the stroke and of ample width, so that the wear is slight. Furthermore, the absence of any fine adjustments in these parts makes it impossible for an unskillful engineer to injure them.

We are advised that the Bucyrus Company has used this form of crosshead for the past five years with good results and that such crossheads outwear the other parts of the shovel.

The thrusting movement of the dipper handle is controlled by a pair of independent engines on the boom, and geared directly to the dipper shaft with double steel gears. These engines are shown in Fig. 2, and are of heavy construction. The bed-plate is cast in one piece, with flanges on the inside to fit the boom, so as to form a rigid brace for the boom, as well as a bed-plate for the

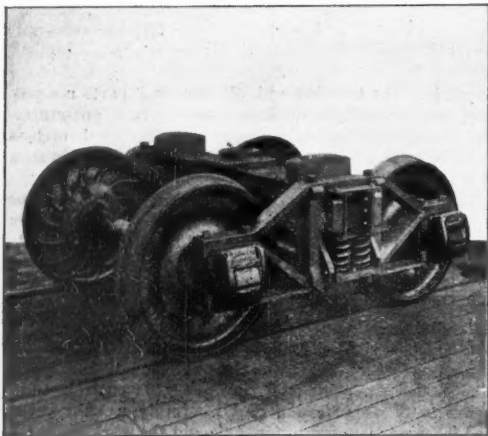


Fig. 3.—Truck of Bucyrus Steam Shovel.

engines. The engines have double cylinders 7 in. x 7 in., and are reversed by means of a central valve. All the valves are of the flat sliding pattern. The crank shaft is of forged steel with the eccentrics between the cranks and in one piece, solid with the shaft. Steam is supplied the engines through a pipe in which there is a bronze swivel joint. By means of these engines the dipper can be held stationary against heavy pressures, or can be thrust in or out at the will of the cranesman, independent of the main engines. The trucks under the car, as shown in Fig. 3, are constructed of steel, and are of the diamond pattern especially designed for use under steam shovels. The truck bolster consists of two steel I-beams, with plates extending the entire length on the top and bottom, so as to form a solid box girder. Coil springs support the bolster and in turn rest on the spring plank formed of a steel channel. The side frames are constructed of heavy bar steel.

The 60-ton shovel for the Great Northern represents the latest practice in steam shovel building, and we are indebted to the Bucyrus Company for this information.

Railroad Building in the South.

In an article in the *Manufacturers' Record* for Sept. 10, Mr. D. Allen Willey has performed a useful service, forestalling some of the work which the *Railroad Gazette* has included among its plans. A brief summary is given for 12 Southern States of the more important new roads now being built or for which contracts have been let as a whole or in part. This summary as prepared by Mr. Willey is as follows:

Systems.

Kansas City, Pittsburgh & Gulf.—Being completed, to Port Arthur, on Sabine Pass. About 20 miles unfinished. In operation through Missouri, Arkansas, Louisiana and Texas, between Kansas City and the Gulf of Mexico. Philadelphia, Boston and Holland capitalists interested. A. E. Stilwell, Kansas City, President; Robert Gilham, General Manager.

Mobile & Ohio, Montgomery & Tuscaloosa Division.—Two hundred and ten miles, including branches to Warrior River coalfields. Graded between Montgomery, Ala., and Columbus, Miss., 180 miles, and contracts for bridge-work let. Being built in the interest of the Mobile & Ohio Railroad Co., by Hanover Construction Co., of Montgomery, Ala.

Mobile, Jackson & Kansas City.—Under construction from Mobile to Jackson, Miss., 180 miles; 30 miles completed and 22 miles additional under contract. New York and English capitalists interested. The Gulf City Construction Co., of Mobile, general contractor.

Arkansas.

Saline River.—Ten miles completed. Total length, 24 miles. To be a branch of Iron Mountain system. J. H. Draughon, at Draughton, Ark., President.

Arkansas Central.—Port Smith to Little Rock, 135 miles. Grading begun on first section, 41 miles. Chicago, Indiana and local parties interested. J. H. Larimer, Peru, Ind., President.

Arkansas & Choctaw.—One hundred and sixty miles projected; 12 miles being constructed by Central City Coal & Coke Co., of Texarkana, Ark., promoters.

Jonesboro, Lake City & Eastern.—To be feeder of the Kansas City, Fort Scott & Memphis; 160 miles projected; 10 miles graded. J. E. Jones, at Jonesboro, Ark., President.

South Carolina.

Ohio River & Charleston.—Branch between Blacksburg and Spartanburg, S. C.; 30 miles proposed; 10 miles graded. Arrangements being made to extend this line from Camden to Charleston, S. C., and from Marion, N. C., to Virginia coal-fields. Boston and Philadelphia parties interested. Samuel Hunt, at Cincinnati, President.

Texas.

San Antonio & Gulf Shore.—Proposed, 220 miles, from San Antonio to Galveston; partly completed and 8½ miles under contract. New York and San Antonio parties interested. Oscar Bergstrom, representative of owners.

Jasper Southern.—Twenty miles proposed; grading completed; local parties promoters. E. I. Kettle, at Jasper, Superintendent.

Texas, Arkansas & Louisiana.—Formerly owned by Atlanta Lumber Co.; eight miles of extension being built. E. Rand, at Atlanta, Tex., General Manager.

Missouri, Kansas & Texas.—Branch to Winnsboro, 13 miles completed.

West Virginia.

Little Kanawha Railroad.—Thirty miles proposed; grading contracts let. Parkersburg and Charleston parties interested. Gooch, Rinehart & Dennis, Covington, Va., general contractors.

Cheat River Railroad.—Thirty-one miles proposed; 6 miles completed. Philadelphia capitalists interested. J. J. Storer, at Rowlesburg, W. Va., President.

Louisiana.

Mississippi River & La Fourche.—Proposed between Napoleonville and Donaldsonville; 12 miles; grading begun. R. W. Edwards, of Lauderdale, La., President.

Texas, Shreveport & Natchez.—Contracts let on 12 miles of extension. B. Collins, at Texarkana, Ark., General Manager.

Louisiana Northwestern.—Homer, La., to Magnolia, Ark., 40 miles; grading contract let and work in progress. J. D. Beardsley, Gibsland, La., Manager.

North Carolina.

Atlantic Coast Line.—Southeastern Railroad division; 12 miles; also branch line 3 miles; contracts partly let. Warren G. Elliott, Wilmington, N. C., President.

Linnville River.—Lumber railroad from Linnville River to Cranberry Station, N. C., on Southern Railway; 13 miles completed. Chicago and North Carolina parties interested.

Aberdeen & Rock Fish.—Work begun on eight miles of extension. John Blue, at Aberdeen, N. C., General Manager.

Durham and Charlotte.—Being constructed between the cities named; 11 miles completed; six miles under construction. Philadelphia and Durham parties interested. F. D. Jones, of Glendon, N. C., Superintendent.

Carriage Railroad.—Twenty-one miles completed; 12 miles under construction. W. C. Petty, of Cameron, N. C., General Manager.

Carolina & Northwestern.—Ten miles in North Carolina under construction (narrow gauge). G. W. F. Harper, of Lenoir, N. C., President.

Virginia.

Richmond, Petersburg & Carolina.—From Petersburg, Va., to a connection with the Seaboard Air Line at Ridgeway, N. C., 45 miles; grading begun. New York and Petersburg parties interested. DeWitt Smith, 50 Broadway, New York, President.

Alberene Railroad.—To extend from Chesapeake & Ohio to Alberene, Va., 12 miles; grading begun. R. E. Shaw, Alberene, Va., Chief Engineer.

Alabama.

Plant System.—Branch of Abbeville Southern division between Newton and Elba, 26 miles, under construction. S. G. McLendon, Thomasville, Ga., President.

Texas & Monroeville.—Lumber railroad; eight miles of extension under contract. U. Blacksher, Monroeville, Ala., President.

Seaboard Railroad.—Five miles of extension under contract. S. R. Prince, at Mobile, Receiver.

Florida, Alabama & Northern.—Thirty miles of extension to Yellow River Railroad being built by the W. B. Wright Company, of Pensacola, Fla.

South Alabama & Gulf.—From Dothan to Elba, 40 miles; grading commenced. Richmond and Alabama parties interested. W. H. Parrish, at Richmond, Va., President.

Mississippi.

Laurel & Northwestern.—Twenty miles of extension under construction. Eastman, Gardner & Co., of Laurel, N. C., promoters and builders.

Natchez, Columbia & Mobile.—Under construction from Norfolk to Columbia, Miss.; work in progress on 25 miles of extension. Norwood & Butterfield Lumber Co., at Norfolk, contractors.

Yazoo Delta.—From Moorhead to Dublin, Miss., 44 miles; 14 miles completed; contracts let for 8 miles additional. C. H. Pond, of Moorhead, Miss., President.

Tennessee.

Tennessee Northern.—Section from Cumberland Gap through the LaFollette coal and iron tract; 13 miles nearly completed; proposed length, 100 miles. Boston and Tennessee capitalists interested. A. A. Glasier, Boston, Mass., President.

Tennessee Northern (this road incorporated under same title as the one above).—Branch of Louisville & Nashville, 14 miles in length, extending to the Cumberland River estuary; all contracts let and work in progress. J. H. Lory, of Bear Springs, Tenn., General Manager.

Georgia.

Georgia Pine Railroad.—From Bainbridge to Arlington, Ga., 39 miles; 10 miles completed; 29 miles under construction. Savannah capitalists interested. Owned by the Georgia Pine Railroad Co., of Savannah, Ga.

Hawkinsville & Florida Southern.—Seventeen miles of extension graded. Atlanta parties interested. J. W. Pope, of Atlanta, Ga., President.

Georgia & Alabama.—Eight miles of extension, from Fitzgerald to Ocala, Ga., completed.

Georgia Northern.—From Moultrie to Sparks, Ga., 23 miles, completed. B. H. Henderson, at Moultrie, President.

South Georgia.—From Quitman to Heart Pine, 25 miles, completed. J. W. Oglesby, at Heart Pine, Ga., President.

Florida.

St. Mary's, Lake City & Gulf.—Fifteen miles completed; extension to Lake City under way. J. W. English, Jr., Atlanta, President.

Florida Western.—To complete system between Tallahassee and Apalachicola, Fla., 22 miles, graded. R. L. Bennett, at Tallahassee, President.

Fort White Southern.—Twenty miles of extension under way. F. W. Pitts, at Fort White, Fla., President.

Atlantic, Suwannee River & Gulf.—Fifty-five miles completed; extension to Gulf of Mexico under way. Jacksonville parties interested. Arthur Meigs, at Jacksonville, Fla., General Manager.

Mr. Willey summarizes his compilation in these words: The mileage in the several states under construction or recently completed is as follows: Florida, 107; Arkansas, 479; South Carolina, 40; Texas, 261; West Virginia, 61; Louisiana, 84; North Carolina, 64; Virginia, 57; Alabama, 354; Mississippi, 226; Tennessee, 114; Georgia, 112. The aggregate in the entire section is 1,651 miles.

American Pneumatic Tools Abroad.

Within the past few years the growth of the use of compressed air in shops in this country has attracted much attention in the mechanical world, and principally because of its influence on labor bids fair to receive

even more consideration in the future. This rapid increase in the use of compressed air apparatus has, however, been a very substantial growth, and we have a good illustration of this in the case of pneumatic tools. Here we find an almost independent industry has increased its trade threefold in two years, and from the articles published from time to time, a general idea can be obtained of the variety of work that can be done by the different tools now being used principally in locomotive works. Their use, until the last year, has been confined to this country, but what appears to be a permanent trade has been built up in Europe, and the tools are now doing the work formerly done by mechanics receiving about one-half the wages paid in the United States. This is the more significant when it is considered that the price of the pneumatic tools is about 20 per cent. more there than here, and the cost of compressors is likewise much higher.

The best evidence we have of their increased use abroad is from Mr. J. W. Duntley, President of the Chicago Pneumatic Tool Co., who returned last week from a trip, covering three months, in which all the important shops in Europe were visited and many orders were taken. He states that there are now 60 pneumatic tools in Russia, 40 in Germany, 60 in Austria, 80 in France and 300 in England. His effort has been principally to introduce the tools in railroad shops, with the result that every important railroad in Europe is either using or arranging to use the machines of the Chicago Pneumatic Tool Co. Especially in England have these American products received favorable notice. At the Imperial Institute exhibit last June Mr. Duntley was invited to make an exhibit, which he did, showing the different tools in operation. Only last month a company was organized in England with the exclusive right to sell the tools in that country, but with the agreement that all orders are to be filled by the Chicago Pneumatic Tool Co.

Mr. Duntley tells of one instance where 20 Boyer machines were ordered by a large concern in France after a trial of two for six months. In these works labor averages from 4 to 4½ francs (80 to 90 cents) a day. If it is economy in such a case to use these labor-saving devices, certainly it should be in this country where the machines cost less and labor is more expensive.

It has been found necessary to keep enlarging the works of the Chicago Pneumatic Tool Co. at St. Louis, and since March they have been running double time.

The above considerations suggest another point. As pneumatic tools are introduced in Europe a demand will gradually be created for compressors, and Mr. Duntley believes that Americans can secure a large part of the trade if the manufacturers will push the introduction of their machines.

The Railway Signaling Club.

This club, which has never before met outside of Chicago, held its September meeting in New York City on Tuesday and Wednesday of this week. The attendance was about 30, which is larger than on any previous occasion, and the meeting was looked upon as highly successful. The President, Mr. W. J. Gillingham, Jr., in his opening address referred to the reason why such an organization as this naturally arose in Chicago, that city being a center of complicated railroad tracks and requiring elaborate signaling, while the very complexity led to great variations in practice; and these variations naturally stimulated consultation and discussion between the signal engineers of different roads. Continuing, Mr. Gillingham said:

"The constitution has been changed so as to provide for the recommending by the club to the American Railway Association of such matters as it may deem necessary to perfect uniform practice in the construction, maintenance and operation of signaling devices. Only by this means can the ultimate intention and desire of the club be accomplished, as the adoption of a standard and uniform practice depends upon the indorsement of the American Railway Association. The report of the committee on rules to govern the operation and maintenance of interlocking plants, approved by the club, has been submitted to the American Railway Association. That favorable consideration will there be given to it there is little doubt, as a committee from that Association has been working on the same subject, and is about ready to make its report.

"Our membership is so scattered that until now we have by force of circumstances been compelled to hold our meetings in Chicago, and from this fact there has been some suggestion that this is a local club. This is an erroneous impression; there has been no action of importance taken without submitting the questions to the entire membership for an expression of opinion. It is hoped that this meeting will inaugurate a new era in the life of the club, and that henceforth there may exist that professional fellowship which will place the Railway Signaling Club where it will take rank with the best organizations for the advancement of railroad work."

Among those present were: C. S. Addison (L. I.), W. C. Banks, G. M. Basford, G. W. Blodgett (B. & A.), John T. Cade, C. H. Dressel, W. H. Elliott (C. & M. & St. P.), D. T. Everts, W. J. Gillingham, Jr. (Ill. Cent.), F. M. Gilbert, Charles Hansel, J. V. Irwin (N. Y. C.), Henry Johnson, Signey Johnson, J. W. Lattig (L. V.), F. Rhea (Penna. Co.), A. H. Rudd (N. Y., N. H. & H.), W. W. Salmon, E. M. Seitz (C. & N. W.), W. A. D. Short (C. & N. O. & T. P.), R. E. Slater (Harlem Line), E. D. Wileman (L. S. & M. S.), A. J. Wilson, A. H. Yocum (P. & R.).

The total membership is now about 73, 16 new members having been elected at this meeting.

A committee appointed to make tests of batteries made a report giving the results of some tests of three different kinds of batteries under uniform conditions. There appeared to be marked differences in the results from different batteries, and this led several members to give experiences differing from those reported by the committee; so that the club, after a brief discussion, recommended the report, with instructions to the Committee to gather more data and report at a future time.

The informal discussion on batteries took up considerable time, and the rest of the afternoon session was occupied by the reading of the paper by Mr. Hansel, an abstract of which appears on the first page of this issue.

The evening session was called to order at 8 o'clock, and it was decided that the discussion of Mr. Sperry's paper should be taken up in connection with that of Mr. Hansel's. The substance of the discussion had to do chiefly with the colors of lights for night signals and with derailing switches.

Mr. ELLIOTT: The Chicago & Northwestern practice—red or green at the home signal and a combination of red and green for caution at the distant signal—is successful in practice, and seems to be the best arrangement at present attainable. The American Railway Association has never declared itself on this subject and seems to be in doubt, and this club might well help to solve this doubt. A change in the present practice must be made, because the danger of a broken glass is serious. The expense of changing to the Northwestern plan would be considerable, but the added safety would justify it.

The speaker deems derailing switches necessary, but the Illinois Commissioners are in some respects too strict in their requirements; they often demand derailing switches, at double-track crossings, for movements in the reverse direction, and detector bars at crossings where there is little or no switching.

Referring to other topics in Mr. Sperry's paper, the speaker advocated the use of caution cards, as a general thing, where permissive signaling is necessary, though rather than stop heavy trains on up grades he would give the permissive indication by the semaphore.

Mr. BLODGETT, in response to an inquiry, described the night signals of the Boston & Albany, where two white lights in a horizontal line indicate stop, and two green lights in a vertical line, all-clear. Mr. Blodgett looks upon the additional expense of the large number of lamps as not very important, and the difference between the stop and all clear signal is very striking.

Mr. RUDD, referring to the fact that the main point of the night color question is the question of a new distant signal, described the plan proposed by Mr. Vern on of the New York, New Haven & Hartford, who recommends the use of a single lamp for the distant signal; to show green for all clear, and for caution (by the use of reflected light) two white lights.

Mr. RHEA described the practice of the Pennsylvania lines west of Pittsburgh, where every home signal post has at least two arms, a fixed arm being added where only one is needed for use. With this the use of green for all-clear becomes a very simple arrangement.

Mr. WILEMAN declared the logical arrangement to be white for danger, green for caution and red for safety, but the meeting did not accord him much sympathy.

Mr. HANSEL described the English practice, where the distant signal at night is the same as the home, and said: The English having made such a remarkable record for safety, why not be satisfied with their plan until we get an illuminated blade? Do not refuse to recognize a good thing simply because it is English. Moreover it is inconsistent for us to make so much trouble about distant signals when they are so often neglected and not used. The speaker had found two plants where the distant signals were disconnected and the connections tied down.

Mr. HENRY JOHNSON, answering questions concerning English practice, and the English rule requiring engineers to stop at the distant signal, said that that rule was not enforced. The English runner distinguishes a distant from a home signal simply and solely by its location. In spite of the difference in rules, the practice in that respect there is the same as here. The English are not afraid to pass a red light. We are too finical in our adherence to the abstract theory that red must not appear on a distant signal. The great safety of the English roads justifies their practice.

Mr. BASFORD: A committee of this club, after making many experiments, made a report on colors for night signals, the substance of which was that the Chicago & Northwestern practice, and the thickening of red glasses, to prevent breakage, were the most feasible improvements. The Chicago, Milwaukee & St. Paul has in use in some lamps a very thick red glass, which is not broken, so as to impair the signal, even when a bullet is fired through it. The English practice, notwithstanding all the good things said of it, would require a radical change of our ideas. The speaker preferred the Chicago & Northwestern plan.

Mr. HANSEL: The distant signal is an evil unless we provide that after a train accepts a clear signal the engineman shall be assured that the right it gives will not be taken away from him until he has passed the interlocking limits, and to provide for this we must have electric locking.

Mr. GILLINGHAM, referring to assertions that the desirability of a change is not pressing, cited numerous

derailments on his road, due to broken glasses. These were mostly in the stockyards district of Chicago, where stone-throwing boys are numerous. If green is to be used for all-clear the best distant signal, until we have an illuminated blade, is the Chicago & Northwestern.

Mr. SEITZ, having had five years' experience with the C. & N. W. plan, declared it satisfactory.

Mr. BLODGETT called attention to the fact that the great record of the English roads for safety was due in part to the extensive employment of men to place torpedoes in times of fog.

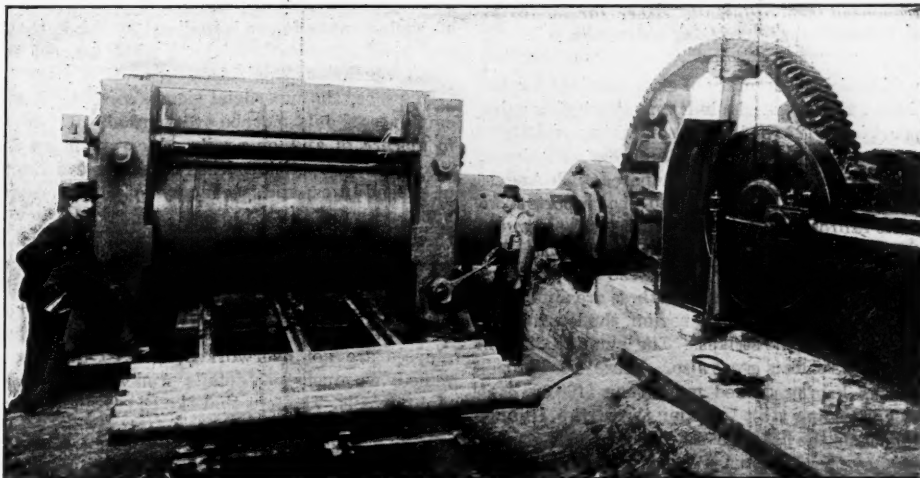
On motion of Mr. Rudd it was voted that the Secretary take a letter ballot to get the views of members as to the best colors for home and distant night signals, the result of the vote to be declared the recommendation of the club until a satisfactory position signal is produced.

DERAILERS.

Mr. LATTIG, taking up the subject of derailing switches, read a paper commenting in detail on that of Mr. Hansel, and criticising the inconclusive character of many of the letters from railroad officers quoted by Mr. Hansel. The derail, if it is an evil, should not be recommended by the club. Mr. Lattig laid out a careful classification of the kinds of accidents liable to happen from the use of derailleurs, and recommended the gathering of full statistics to show from experience whether derailleurs have done more good than harm. Unless electric locking is used the speaker was unprepared to advocate the use of derailleurs. Electric locking ought to be more fully investigated. The cost of maintaining track circuits on the Lehigh Valley averages \$33.11 per mile per year.

Mr. HANSEL, answering the previous speaker, declared all facing point switches to be evils; we cannot avoid recommending the least of two evils.

Mr. ELLIOTT, speaking (from memory only) of his experience with 75 plants for three years said that derail-



Machine for Rolling Steel Car Axles—Keystone Axle Co., Baltimore, Md.

ments had occurred when derailleurs were necessarily open and also when they were open by the negligence of the signalman. The worst cases happened when a train was actually in the way on the transverse track. His road (the C., M. & St. P.) is now putting derailleurs in at all the most dangerous places, even where the Illinois state rule does not require them.

Mr. SALMON: Until the presentation of this evidence by Mr. Hansel I had thought the derailer a good thing, but these facts raise a number of doubts. In this connection, if the very good record of the English roads, as to carrying passengers safely, is held to justify the English practice in the matter of lights at night, why does it not also justify their non-use of the derailer? The speaker questioned whether the derailer should rightfully be called a moral safeguard. If it is such, why not put one in at every train-order signal?

Mr. CADE, answering questions concerning English practice, held that the superior discipline of English enginemen and signalmen largely accounted for the better record of the English roads with less complete mechanical safeguards. If we had had their efficient men we should never have felt so great need of derailleurs. The speaker advocated requiring trains always to make a stop when finding the distant signal at danger. It will be answered that such a rule would produce a great many unnecessary stops, but this is not by any means certain. Signalmen are not alert; if trains were stopped it would soon be found that the distant signals were often held against them unnecessarily, and complaints to the Superintendent would very soon lead to better practice in the cabins. Mr. Cade discussed electric locking at length, describing the difficulties of getting simple and efficient apparatus and competent inspectors.

The discussion of derailleurs was left unfinished and the club adjourned to Wednesday evening. On Wednesday the members went, by invitation of the Lehigh Valley Railroad, to Easton, Pa., where an inspection was made of the shops of the National Switch & Signal Co.

The club accepted an invitation from the New York, New Haven & Hartford to inspect, on Thursday, the signaling of the New York Division of that road and the interlocking plant at Hartford, with a side trip to New Britain to see the electric railroad.

Rolled Steel Car Axles.

On Aug. 14 last a general invitation was given to the public to visit the Keystone Gas Works, at Beaver Falls, Pa., to witness a new process of rolling steel car axles. The tests made that day met the requirements of the Pennsylvania Railroad Co., and were conducted under the direction of engineers from the Pittsburgh Testing Laboratory. The following are the conditions and the results of the test:

Distance between supports.....	3 ft.
Height of drop.....	2 1/4 in.
Weight.....	1,640 lbs.
Deflection, blow No. 1.....	5 1/2 in.
" " " 2.....	6 1/2 in.
" " " 3.....	6 1/2 in.
" " " 4.....	6 1/2 in.
" " " 5.....	6 1/2 in.

The accompanying engraving shows the roller with connections, which weighs complete 150 tons. One hundred and fifty revolutions of this roll, which is 4 ft. in diameter, completely form the axle in less than one minute, and the company expects to be able to turn out 600 axles a day when they are in full running order. The new building is made of steel, 80 x 200 ft., and the lifting is done by compressed air hoists. The capacity of the steam plant is 1,500 H. P.

The shell of the rollers herewith shown weighs 80,000 lbs. Die plates are used inside of the cast shell, and in this process a steel bloom 9 in. square is first taken and reduced by the rolls to 5 1/2 in. round iron. This is cut into three parts each the exact length of an axle. These pieces, after being brought to a proper heat, are passed longitudinally through the axle machine at the rate of two a minute, and cut out perfectly shaped axles and correct in size with the exception of the journal and wheel seat which are 1/8 in. large.

The officers of the Keystone Axle Company are: President, Geo. W. Morris; Vice-President, D. A. Clark

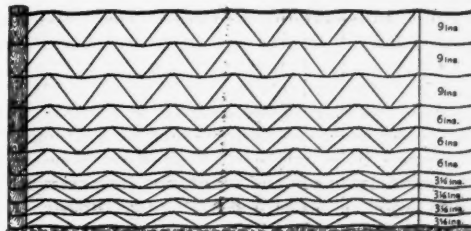
(formerly President); John T. Rowley, General Manager, and W. H. Trump, Treasurer. The office of the company is at 608 Times Building, Pittsburgh, Pa.

New Eastward Record of the St. Louis.

The American Line steamship St. Louis arrived at Southampton, September 8, after a passage from New York of 6 days 10 hours and 14 minutes, thus lowering the eastbound record, made by the Hamburg-American line steamship Fürst Bismarck, in September, 1893, by 41 minutes. The St. Louis and the St. Paul now hold the Southampton records, the former having the eastward record and the latter the westward record, made in August of last year, the time being 6 days and 31 minutes.

McMullen's Spiral Spring Fence.

The McMullen Woven Wire Fence Co., of Chicago, has lately placed on the market a new fence for railroads which is shown in the engraving. The principal feature is the use of a high grade of tempered steel wire for the horizontal wires, twisted to a uniform spiral throughout the entire length of the wire, providing for expansion and contraction. No. 7 wire is used for the top, No. 9 for the bottom and No. 10 for the intermediate wires of



the fence and No. 12 wire for the cross or tie wires, of which there are 24 to the rod, making a heavy and substantial fence. These are arranged as shown in the cut, the tie wires forming a support. The wires are double galvanized and the tie wires are loosely wrapped around the horizontal wires to avoid cracking the galvanize coating. A section of the fence was shown at the Roadmasters' Convention at Old Point Comfort this week.



ESTABLISHED IN APRIL, 1856.
Published Every Friday,
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The *Chronicle's* summary of gross earnings for August shows, as was anticipated, very gratifying gains. The report is for 123 roads with something over 97,000 miles worked, and here the gain in gross was almost \$5,000,000, or 12½ per cent., as compared with August of the year before. It is believed that reports from the whole railroad system of the United States would show a gain of from \$10,000,000 to \$12,000,000. The gains have been very general. Of the 123 roads reporting, only 36 show losses, and these are almost entirely in the bituminous coal region, the losses being in consequence of the strikes. The amount of gain by individual roads is great also. There are 16 roads reported as having gained more than \$100,000 each over the preceding year. Among these, the Illinois-Central heads the list with an increase of \$511,000. Next comes the Missouri Pacific with \$477,000, the New York Central with \$456,000, the Rock Island \$376,000, Canadian Pacific \$298,000, Chicago, Milwaukee & St. Paul \$256,000 and the Oregon Railroad & Navigation \$224,000. Only two roads are reported as having had losses exceeding \$30,000. One of these is the Columbus, Hocking Valley & Toledo, the other the Wheeling & Lake Erie, which lost \$51,135 and \$30,408 respectively. The grain receipts for the Western primary markets aggregated 71,613,000 bushels against 48,166,000 in the same four weeks last year. The greatest increase was at Chicago. The live stock movement was also larger, but the cotton movement fell off heavily.

A few days ago a bad collision occurred in Colorado involving a passenger train of the Denver & Rio Grande Railroad. The train was wrecked and burned. The press dispatches state that the wreck was set on fire by the explosion of a Pintsch gas tank under one of the cars. We have taken measures to ascertain the truth of this, but think it proper to record now, in advance of any specific information, our disbelief in the possibility of the wreck having been set on fire by the explosion of a gas tank, and our disbelief in the probability of the fire, once started, having been made worse by the explosion of cylinders containing compressed gas. The gas tank is outside of the car. If it were broken in a wreck, or exploded, the gas would instantly expand into the atmosphere and be mixed with air below the point of combustion or explosion. If a spark happened to be near the tank at the moment of rupture there might be a flash of gas flame, but this could last only an instant, not long enough to ignite wood or other material. Or, further, the explosion of a gas tank might scatter coals from a fire already burning. Such, it seems to us, is the theory of the situation. As to actual experience, we have yet to learn of one authenticated instance in which the presence of compressed gas has caused a fire in a wreck, or aggravated a fire in a wreck. Indeed, we have yet to learn of a case in which compressed gas, as the apparatus is now applied to railroad cars, has exploded, or caused any inconvenient or dangerous

fire. We remember one case (and very likely there have been others) in which gas leaked into a saloon and was lighted by the flame from the conductor's lantern and did considerable damage. In this case, however, the reducing valve was inside the car and gas was admitted to the saloon under pressure. As the apparatus is now arranged in all good practice, the reducing valve is outside of the car. It seems to us simple justice to a large commercial interest to state these facts and opinions. If, however, we are mistaken, if our theory is wrong, or if there are facts of record which go to disprove anything that we have said, we hope to be set right. This matter is so important that no one ought to be allowed to remain in error as to actual facts.

The Emporia and New Castle Collisions.

There were two very bad butting collisions last week, killing a score or more of passengers and trainmen, many of whom were burned to death; and the general subject of railroad accidents is revived in the editorial columns of the daily newspapers. It is over a year since the disasters at Atlantic City, N. J., and Logan, Ia., occurred, and since that time we have had nothing so bad as these cases now reported (though 20 or more persons were killed by a bridge disaster at Gurnee, Ala., Dec. 27, 1896), so that the press commentators take up the subject as a fresh one. We are bound to say that their remedies are as far from adequate as ever. We do not say this as a reproach; we have no novel cure-all of our own to offer; but the sage reflections on overworked employees, and the failure of the law to punish, seem to be as pointless as ever; and after reading a number of such comments one is inclined to think that the real need is to clearly set forth what are not remedies for collisions.

In a sense the superficial view is correct. Railroad employees should not be overworked, for overwork means errors, and on a railroad errors mean death. Excessive competition leads to extreme reductions of expenditures; and "economy" of that kind tempts a manager to take a little additional risk now and then, or makes him too timid to boldly spend hundreds of thousands of dollars for improved means or methods, even when he knows the change would be profitable. But these considerations do not get down to the difficulty. We have collisions when the employees are not overworked, and to find the true remedy we must study details. And we must study the right details. The fact that the Rio Grande Junction Railroad is used by the trains of two companies does not mean "divided management, requiring extra care," as one of our contemporaries has it; it will be found that the relations of the different trains to each other, as far as safety is concerned, are precisely the same as though everything were owned and managed by a single company. The use of a railroad by two companies is common all over the United States and Great Britain. The number of employees per mile of road is also a useless fact to moralize upon. England does, indeed, have four times as many as we, but she does four times as much business per mile. Moreover, the additional men, where there really is a difference, are mostly for convenience, not for safety.

Again, we are prepared to hear that the recent increase in business had nothing whatever to do with the forgetfulness that caused these collisions. Just such errors are made when business is dull, though naturally there are fewer of them. Forgetfulness in a conductor has to be guarded against by elaborate regulations, carefully administered. One important feature, the value of which is not recognized by railroad managers generally, was emphasized in the *Railroad Gazette* of June 18, p. 442. We are not, however, at this time criticising the conduct of this particular conductor, but merely calling attention to the fact that a general order, voted in a directors' meeting, does not cure forgetfulness.

The foregoing considerations are obvious, without

At midnight of Sept. 9 on the Rio Grande Junction Railroad near Newcastle, Col., a westbound passenger train and an eastbound cattle train met while running at full speed and the forward portions of both trains were completely wrecked. The reports state that the boiler of the passenger engine exploded immediately after the collision and from the firebox or some source the wreck took fire and most of it was very quickly burned up. The number of persons killed has not been determined, as somewhere from four to a dozen or more bodies were found in the wreck so badly burned as to be indistinguishable one from another. Fourteen or more persons were injured. On the evening of the 8th, near Emporia, Kan., there was a butting collision of fast passenger trains of the Atchison, Topeka & Santa Fe, which, so far as the effect on the cars and engine is concerned, seems to have been worse than the Colorado wreck. There were three locomotives and it is said that the boilers of all three exploded. One or more passenger cars were piled on top of the engines, making a furious fire which defied all attempts at rescue. A dozen or more persons were killed, but not many of these were passengers. The names of nine trainmen are published and there were two tramps in the list. Seventeen or more were injured. It is said that a telegraph operator failed to deliver an order to the passenger train. In the Newcastle case the fault is said to lie with the freight train, the conductor of which misread an order or a schedule in the time table.

regard to whether trains are kept apart by time interval or space interval. The radical remedy, and the most effectual, is the adoption of the space interval for all trains; the next best is the space interval before and behind passenger trains. On this one point those daily newspapers which try to get at details are, we are glad to see, generally right. They advocate the block system. In so far as their utterances help to mold public opinion, this is in the right direction. But it must be remembered—and here is the hard spot in the problem—that advocating the block system is quite different from paying for it. It requires considerable courage in the finance committee to adopt it. Many managers admit that it would be good economy, in the end, but feel that their roads are too poor to be economical.

Whatever the system or methods, men are sometimes careless, and carelessness must be guarded against with eternal vigilance. We are not trying to shield culpable negligence, and we do not call for relaxation of any criminal law; but the comments of the press in these cases—declaiming against "criminal negligence" while remaining silent concerning the universal inability of prosecuting officers to secure conviction or punishment of negligent conductors and engineers when they have been arrested—do seem to us to strongly support the view that remedial measures, to be effective, must be applied beforehand. If the fear of legal punishment could prevent these disastrous collisions they would have been done away with long ago; for, although the law has not actually laid its hand on many men, and therefore has not made itself terrible by the force of example, conductors and engineers are, nevertheless, men of more than average susceptibilities and they have a proper respect for the statute books. Lack of carelessness does not indicate lack of conscience but lack of training.

Annual Reports.

Cleveland, Cincinnati, Chicago & St. Louis.—The fiscal year ends June 30, and the annual report for 1897, just at hand, shows the year to have been one of the most unfavorable in the company's history. Gross earnings were less than in any other year but one, and net earnings were the lowest since the company was formed. Revenue fell off so much that the directors were compelled to pass the July quarterly dividend on the preferred stock, which has received 5 per cent. since 1890. Even the 3½ per cent., which was paid, calling for \$375,000, was not quite earned in the year. The tabulated results of operations for three years are given below:

	1897.	1896.	1895.
Freight earn.....	\$8,254,872	\$8,576,700	\$8,783,929
Passenger earn.....	3,665,193	4,055,326	3,785,410
Total gross.....	12,117,111	13,704,535	13,625,028
Working expen. and taxes..	9,864,664	10,293,703	10,254,068
Net earn.....	\$2,252,447	\$3,410,832	\$3,370,960
Interest and rentals.....	2,883,926	2,844,510	2,844,766
Balance.....	\$368,521	\$766,322	\$526,254
Dividends on pref. stock....	375,000	500,000	500,000
Surplus (def.).....	\$6,479	\$66,322	\$36,254

Including the revenue of the Peoria & Eastern and other controlled lines the total gross was \$14,833,100, a decrease of \$865,591; net earnings were \$3,607,114, a decrease of \$278,438. The losses in income were sustained in the first half of the fiscal year; since January there has been a slow but gradual improvement, and the earnings during the fiscal year just beginning promise to be satisfactory. Last year a large crop of corn was harvested along its lines, and the one now maturing promises also to be large. Good wheat, hay and oat crops have already been gathered, and with the starting up of factories and the settlement of the coal strike the affairs of the company will once more be in a prosperous condition.

The loss of \$322,000 in freight receipts and of \$370,000 in passenger revenues is explained by decreased tonnage and travel and a falling off in the rates. The tonnage moved was 4½ per cent. less, and 14,670,000 fewer ton miles were run, equal to a decrease of 4½ per cent.; freight train mileage decreased only 113,296 miles, or two per cent., while passenger train mileage increased about two per cent., although the revenue fell off, as we have noted above, by about nine per cent. Freight train earnings per mile were \$1.52, as against \$1.54; passenger train earnings were 93 cents, as against \$1.01. The ton-mile rate fell off from 63.1 cents to 61.4 cents.

Of the saving in working expenses, \$429,000, the cost of conducting transportation accounts for \$181,000, maintenance of equipment, \$146,000, and maintenance of way, \$83,500. The decrease in the latter account is due to less rebuilding of bridges and less renewals of ties and rails. There have been laid 6,865 tons of 80-lb. rails; 656,209 ties have been renewed, and 493,293 yds. of ballast have been distributed. Since the close of the fiscal year 1,000 box cars have been contracted for. Their cost will be charged into operating expenses, but of the sum required, \$174,873 will be provided out of credits, representing sums charged against expenses in the last two years for equipment, and not expended. An unusual item,

in the operating expenses is "Y. M. C. Associations etc.," \$8,632. It does not occur in the Chesapeake & Ohio report, which we should judge pays more for maintaining these associations than this company.

During the year the company has sold $2\frac{1}{2}$ millions of general mortgage at 80, and with the proceeds reduced its bills payable, \$788,000, to a nominal figure, and also paid off \$362,000 of its equipment notes, which are now reduced to \$376,000, which will be paid off in three years. The advances to the Peoria & Eastern, and on account of the Louisville extension, amounting to \$143,969, which has been carried as an asset, was charged to profit and loss.

Wabash.—The annual report for the year ending June 30 shows large losses in revenue and traffic. Gross earnings were \$1,280,355 less than in 1896, and \$433,000 less than in 1895, which previously had shown the least income of any year. But by a saving of over 1½ million dollars in working charges, the net in 1897 was only \$16,909 less than in the previous year, and the obligatory charges were met, leaving a credit of \$28,000. If last year's rates could have been obtained, this figure would have been \$402,500 larger, out of which, of course, full interest could have been paid in the Series A debenture bonds. The past three years have severely tested the earning power of the company, but in a year when earnings were lower than in any other year, and lower than they are likely to be for many years, it has earned all its fixed charges.

The results for three years are as below:

	1897.	1896.	1895.
Freight earn.....	\$7,601,770	\$8,480,551	\$7,932,816
Pass. earn.....	2,837,974	3,239,977	2,992,636
Total gross earn.....	11,526,787	12,897,112	11,959,839
Oper. expen.....	7,979,159	9,212,605	8,291,030
P. c. exp. to earn.....	69.22	72.17	74.59
Net earn.....	3,547,628	3,564,538	3,038,809
Gross earn. per mile.....	5.933	6.614	6.179
Net earn. per mile.....	1.832	1.841	1.570

Working expenses fell off \$1,263,445, equal to 13.67 per cent., so that net earnings were about the same as last year, and \$509,000 more than in 1895. They were \$826,000 over the net of 1894, and more than in 1893, when gross was \$14,220,000, or nearly \$2,700,000 higher than in 1897. It will be worth while to examine into the charges in operating expenses, so far as space will permit. The saving in maintenance items is \$589,813, and cost of handling traffic, \$508,638. Of course the falling off in traffic in itself accounts for part of the decreases in these items. Tonnage and ton miles, passenger travel and mileage, were much less than in any other year except 1894 and 1895, and the improvement as compared with those years is not great. But while ton miles decreased 68½ millions, or 5½ per cent. the saving in freight train mileage was 911,000, equal to 14.4 per cent., or nearly three times as great as the loss in ton miles. Naturally there were other advances in cheapening the cost of handling traffic. The train load increased 19.8 tons and is now 212.8 tons, being larger than ever before. The General Manager states that with the new heavy freight engines to be put in service this year, the average train load will be increased to 280-300 tons. As late as 1895 it was only 176 tons. Freight train mile earnings increased from \$1.34 to \$1.41, although the ton-mile rate fell from 6.96 mills to 6.61 mills.

The fuel account decreased \$198,218, of which \$185,356 was in locomotive fuel, equal to 29.78 per cent., about three times the percentage of decrease in engine mileage. The explanation of the large saving here is in the reduced cost of coal, obtained partly by using lower grades, and partly through better inspection. In 1897 the company used 18,319 less tons of coal for engines than in 1896, and coal cost \$177,520 less. The total fuel account was \$201,774 less. The average cost per ton was but 69.2 cents against 96.4 cents. The cost of fuel per engine mile (3.42 cents) the report says is lower than that of any other road of similar mileage, but the coal-fields of Illinois and Indiana are tributary to the Wabash line.

Chicago Great Western.—There are 30 pages of the 1897 report to be turned over before the statistical portion is reached. This does not mean, as those familiar with this company's reports may assume, that President Stickney's customary excursion into economic, not to say academic, matters is somewhat larger than usual; in fact the literary matters may be something less than it generally is, but an artistic touch has been added. There are 15 pages of engravings, representing various features of the property of which Mr. Stickney thinks his English and Dutch security holders ought to have ocular demonstration. He gives photographic illustrations of the grade reducing now going on; the method of trestle filling; new bridges and station; "a section of standard track" which looks as neat as if it had been scrubbed by a Dutchwoman. There are also cuts of the leased terminals at Chicago, and of a very commonplace one-story freight-house at that point, which we are told is "occupied exclusively by the Chicago Great Western." Mr. Stickney's fertility of resource is not to be suppressed. If the Interstate Commerce Commission decides that he cannot secure grain traffic by novel methods, it cannot prevent him from introducing novelty into his annual reports.

The statistics of operation for the year ending June 30, 1897, show a loss of \$28,961 in gross earnings, which, as the report states, was more than made up by the increase in earnings in July last—\$48,440 in gross and \$34,668 in net. In August, 1897, gross increased \$70,665,

making a gain of \$119,000 in two months. The results for three years are as below (mileage operated 928):

	1897.	1896.	1895.
Gross earn.....	\$4,680,850	\$4,709,820	\$3,636,099
Oper. expen.....	3,427,587	3,310,242	2,856,749
Net earn.....	\$1,253,272	\$1,399,578	\$819,350
Taxes.....	153,000	144,000	120,000
Rentals and equipment..	434,206	436,602	418,616
Interest.....	210,752	186,492	167,520
Balance.....	\$455,313	\$632,483	\$83,214
Dividends on 4 per cent. cash debenture.....	364,541	321,908	303,354
Balance, to credit, income account.....	\$90,772	\$310,575 (Def.)	\$220,143

Freight revenue was \$3,549,011, or \$5,914 more than in 1896; passenger revenue was \$988,592, or \$33,474 less. The increase in operating expenses was \$117,345, but more than this amount was due to increased cost of handling traffic. This account was \$140,162, or 8½ per cent. more than in the preceding year. This was due the improvement work going on—reduction of grades on 29 miles, renewal of 300 bridges, ballasting, tie renewals, etc., and consequent disturbance of traffic, inconveniencing the movement of trains, and decreasing the train load (which is not stated in the report). The revision of grades will reduce the maximum to 26 ft. a mile, except at a few points. Maintenance of way charges were \$676,026, an increase of 5.05 per cent.; equipment maintenance cost \$466,997, or 12 per cent. less than in 1896. The tonnage was \$1,469,215 as compared with \$1,376,579; the rate per ton was \$2.42 against \$2.57, but the ton-mile rate is not given, nor is the ton mileage. Freight train mileage was 2,006,890 against 1,941,615; work train mileage was 285,392 against 118,288 or more than double. The total engine mileage was 4,899,205 against 4,524,706, but an unusually large proportion of the total is switching, 476,037 miles against the 2,129,819 run by freight engines.

Gross and net earnings per mile for five years are as follows:

	1897.	1896.	1895.	1894.	1893.
Gross earn.....	5.944	5.979	3.942	4.349	5.510
Net earn.....	1.351	1.509	.888	1.224	1.223

Gross earnings in 1893 were \$5,083,000, the largest ever earned; the gross per mile was also the largest, but it will be noticed that although this figure in 1897 is \$466 less than in the earlier year, net is but \$124 less, which makes a favorable comparison. The gross earnings per mile on the St. Paul road were \$4,955 in 1897 less than on the Chicago Great Western.

Long Island Railroad.—In the report of this company for the year ending June 30, no comparison of the results of operation with previous years has been attempted. During quite a period heavy expenditures made for betterments were charged to capital account. The present policy of the Directors is to charge many such to income account, and there has been a revision of the accounts with that principle in view, and many of the items transferred from capital to income should properly be apportioned over several years. Therefore, a comparison made on a revised statement for the year 1896 alone would be misleading. Under the present system no charges have been made to capital account, except those which represent the acquisition of new property. Arrangements for funding the whole floating debt are under consideration, and it is believed will be carried out.

Very brief allusion is made in the text of the President's report to some of the great and complicated problems which now confront the officers of the Long Island. One of these is the severe competition with trolley roads, under which much of the local passenger business is lost, perhaps never to be recovered, and it is quite obvious that more business will go in the same way unless changes are made in methods of operating parts of the Long Island lines.

Furthermore, a proper development of the great suburban business of the road, which, after all, is very much the largest part of its business, requires quick and convenient access without additional fares, and without change, to the lower part of Manhattan Island. The method of securing this access is now under serious study, and it is the hope of the President and Directors that the engineering, political and municipal difficulties now in the way will be speedily removed. We are credibly informed that there are no financial difficulties, but that the project for a tunnel entrance to the lower part of the island is practically underwritten. We may probably say with safety that the engineering difficulties are also cleared away; that is, the project is comparatively easy of accomplishment in the present state of the art.

Another interesting matter briefly referred to in the President's report is that of the influence on the fortunes of the Long Island road and of Long Island itself of the bicycle. This is building up suburban resorts, is encouraging the building of good roads and is directly and indirectly promoting traffic on the railroad. This traffic is, however, handled at considerable inconvenience. The statement is made, in fact, that during this season more than 100,000 bicycles have been carried as baggage, and we have been informed by the General Superintendent that on the afternoon of July 5 the company handled 4,784 bicycles. As many of our readers know, the company has appointed a special bicycle agent, whose duty it is to develop and encourage this part of the company's business. We have long been of the opinion that this is the reasonable course to take on any railroad where conditions are such that it is possible to develop a large bicycle traffic. Opposition or indifference

can only postpone the inevitable, and "he gives twice who gives quickly."

The main results of operation for the year reported on are as below:

Gross earnings.....	\$3,954,866
Working expenses.....	2,737,200
Net earnings.....	\$1,217,666
Other income.....	114,845
Total income.....	\$1,332,511
Fixed charges.....	1,230,306
Net surplus.....	\$102,205

The New York & Rockaway Beach Railway (a controlled line), which does almost exclusively a short trip pleasure passenger business, made gross earnings of \$216,897, a decrease of \$42,000 from the year before, and the net earnings did not pay fixed charges by \$55,000. The Prospect Park & Coney Island Railroad, another controlled line of nearly 10 miles, 77½ per cent. of whose earnings are from passengers, fared a little better, the gross earnings, \$157,509, showing an increase of about \$300. The operating expenses were somewhat reduced, leaving net earnings of \$23,740, against \$10,778. Nevertheless, this road also showed a deficit after paying fixed charges.

An interesting fact shown in this report is that while passenger train mileage decreased nine per cent. freight train mileage increased six per cent. We have been informed that an important element in the increase in freight earnings is in the transport of road material, the movement of which has been quite extraordinary this year. This is largely the result of the agitation of the wheelmen, helped along by the Long Island Railroad Company itself.

It seems to us that the proper way to look at the Long Island Railroad to-day is that it is going through a phase of radical change in policy and that we must wait a year or two to see the results of this change. It is quite apparent that the effort of the present management is to develop the property on quite a different theory from that which has been held heretofore. It is recognized that the prosperity of the Long Island Railroad depends upon the development of the small towns along the line, so that they shall be not merely summer resorts, but places of residence; thus not only increasing the business done at maximum hours, but more perfectly "equalizing the load," as the power house men have become so fond of saying.

The Government crop report for Sept. 1 shows the condition of corn to be 79.3 as compared with 84.2 one month previous and 91 a year ago; and of wheat 85.7 as compared with 74.6 one year ago. The wheat figure is 4.5 higher than the September average for the last 10 years. Mr. J. C. Brown, Statistician of the New York Produce Exchange, has estimated, on the basis of the foregoing percentages, that the total spring and winter wheat crop this year will be 463,225,000 bu., which is about 13 millions above the estimate made a month ago and nearly 36 millions better than the actual harvest reported in 1896. This actual harvest, however, was about 33 millions larger than the estimates which were made at this time last year. The acreage this year, 34,569,000, is a trifle less than that reported in 1896. Mr. Brown estimates that the corn crop will be 1,858,204,000 bu., which is over 112 millions less than was estimated a month ago and about 425 millions less than the actual corn harvest reported in 1896. The corn acreage this year is estimated at 80,095,000 as compared with 81,027,156 last year. The estimate of the oats crop is 686,697,000 bu., which is about 55 millions greater than the estimate made a year ago; and moreover the actual yield reported last year was about 12 per cent. greater than the estimate. In the condition of the cotton crop the Government report shows a marked decline from one month ago, the September estimate being 86.9. The average condition a year ago was, however, only 64.2. It is said, however, that much of the cotton crop this year is late and, therefore, more than usually subject to the uncertainties of early frosts. The Government estimate on Sept. 1, 1896, turned out, however, to be very much too low.

The *Commercial and Financial Chronicle* has issued its elaborate annual statement of the cotton crop of the United States for the year ending Sept. 1, 1897, and makes the total production 8,714,011 bales, of which 5,968,422 bales were exported and 2,887,047 were taken by spinners. In tabular form for three years the figures are, in bales:

Year ending September 1.	1896-97.	1895-96.	1894-95.
Receipts at the shipping ports..	6,816,325	5,394,875	7,882,163
Add shipments from Tennessee, etc., direct to manufacturers..	873,004	851,788	1,157,251
Total.....	7,689,329	6,246,663	9,039,414
Manufactured South, not included above.....	1,024,482	915,810	853,352

Total cotton crop for the year... 8,714,011 7,162,473 9,892,766

The increase this year over 1896 seems to be quite evenly distributed. The increases at the various ports (which, of course, do not include the overland shipments or the southern consumption) were as follows in thousands of bales: Louisiana, 1,810 in 1896 to 2,128 in 1897; Alabama, 200 to 292; Texas, 1,167 to 1,487; Georgia, 899 to 1,019; South Carolina, 372 to 476; North Carolina, 199 to 281; Virginia, 495 to 715. Of the exports Great Britain took 2,913,817 bales. The average weight of bales this year was 503.08 lbs., as compared with 502.03 the previous year. In Alabama, however, the increase was nearly 8 lbs.; that is, from 499.62 to 507.35. In view of the back-

wardness of the crop this year the *Chronicle* refrains from making decisive comments on the cotton prospects at the present time.

The Treasury Department statement of exports for the month of August shows that Baltimore exported more grain than any other one port; and that port leads not only in the total quantity of grain of all kinds but in wheat. In this latter commodity it exported more than four times as much as in August of last year and more than twice as much as New York. There were also large exports of wheat from New Orleans and Galveston, about five times as much as went out from those ports in August of last year. In oats New York still maintains its supremacy, exporting nearly 4,000,000 bushels, which is nearly four times the quantity shipped out in August of last year, and about five-sixths of all the exports of oats from all the ports in the month reported upon. The accompanying table shows the exports from the eight principal ports:

GRAIN EXPORTS FROM ATLANTIC AND GULF PORTS (IN THOUSANDS OF BUSHELS).

	Corn.		Wheat.		Oats.		Corn, wheat and oats.	
	1897.	1896.	1897.	1896.	1897.	1896.	1897.	1896.
New York—August.....	3,721	2,325	2,350	824	3,883	1,070	9,554	4,219
8 mos. to Aug. 31.....	20,407	12,101	12,561	11,363	17,992	11,671	50,960	35,135
Boston—August.....	1,322	621	717	1,036	554	247	2,693	1,904
8 mos. to Aug. 31.....	7,139	3,224	6,116	5,583	3,244	1,505	16,499	10,312
Philadelphia—August.....	2,332	546	561	624	40	409	3,533	1,170
8 mos. to Aug. 31.....	17,969	4,578	1,775	2,156	440	409	20,214	7,143
Baltimore—August.....	3,307	1,639	5,185	1,199	60	770	8,552	3,608
8 mos. to Aug. 31.....	31,176	14,205	7,529	3,492	2,692	2,428	41,397	20,125
New Orleans—August.....	867	1,433	1,231	267	79	48	2,177	1,748
8 mos. to Aug. 31.....	19,490	14,896	1,686	1,625	727	146	21,903	16,667
Galveston—August.....	216	1,392	310	.....	.....	.....	1,392	526
8 mos. to Aug. 31.....	3,664	3,904	1,487	331	.....	.....	5,151	4,235
Newport News—August.....	966	449	705	.....	.....	618	1,701	1,067
8 mos. to Aug. 31.....	11,888	6,735	767	14	399	3,212	13,034	9,961
Norfolk—August.....	559	1,594	324	.....	.....	.....	883	1,594
8 mos. to Aug. 31.....	8,001	8,536	324	.....	.....	.....	8,325	8,536
Total—August.....	13,704	8,823	12,465	4,260	4,616	2,753	30,785	15,836
8 mos. to Aug. 31.....	119,744	68,179	32,245	24,564	25,494	19,371	177,483	112,114

NEW PUBLICATIONS.

Proceedings of the Master Car Builders' Association, Vol. 31, 1897. John W. Cloud, Secretary, The Rookery, Chicago.

The report of the proceedings of the convention held by this association at Old Point Comfort last June has just made its appearance. It fills a well-bound book of 443 pages, and about 46 plates, 24 of which are folded in at the back of the volume. The order of the contents is about the same as usual: first a list of conventions; the officers of the Association; standing committees; subjects and committees for 1898; list of members; constitution; by-laws, all of which occupy the 24 pages preceding the body of the report. Then follows the record of the year's doings in the way of reports and discussions; 108 pages are filled by the report of the Arbitration Committee, which is followed by the Code of Rules of the Association, occupying 42 pages, which is again followed by Standards and Recommended Practice. Two appendices and the obituaries followed by an index complete the volume up to the plates in the back.

The Secretary of the Association has just sent out a notice calling attention to a misprint in the Rules of Interchange, which went into effect on the first of this month. About one-third the way down page 27 of the Code—page 357 of the bound volume—1 releasing rod for M. C. B. coupler, replaced, refrigerator cars, 2 hours, 10 cents, should read $\frac{1}{2}$ hour, 10 cents.

The Universal Directory of Railway Officials. Third annual edition. Compiled by S. R. Blundstone, Editor *Railway Engineer*. London: The Directory Publishing Co., Limited, 18 Catharine St., Strand, W. C., 1897. Price 10s.

The first edition of this directory appeared in 1895, and each later edition has been revised and enlarged, the principal additions to the 1897 edition being in Belgian and other continental light railroads, in the railroads of Africa, Japan, Chili and Siberia, and in more complete lists of officers of the railroads of the United States.

The whole volume, apart from the advertising pages, is only 355 octavo pages. Consequently, it is not to be supposed that the various lists of railroad officials are as complete and full as some of the local lists with which our readers are familiar; but it covers the whole world, and we have used it from its first publication with great convenience. We have not attempted to verify the list for the railroads of the United States inasmuch as more complete directories are available, but in our experience we have always found the foreign lists sufficiently accurate and full for our purposes.

The plan of the Directory is to give the railroads of each country in alphabetical order, and under each railroad the mileage, gage, something of the amount of rolling stock and a pretty complete list of the principal officers of the various departments. There is also an alphabetical finding list or personal index of railroad officials.

Blue Book of American Shipping. Cleveland: *Marine Review*, 1897. Cloth, pp. 450. Price, \$5.

This is primarily a directory of the shipping interests of the United States. It contains information concerning all American steamers and sea-going sail vessels. The body of the book is divided into three parts, indicated by red, white and blue edged leaves, respectively. The first of these, comprising about 140 pages, relates to the business of the Great Lakes. The second division,

of 66 pages, consists largely of full-page half-tone illustrations; while the other division contains information regarding our coast and river interests. It should also be added that the last 90 pages or more are given up to classified advertisements of marine business concerns. There will be found in the book the names and addresses of the owners or managers of all our steam and sail vessels; the names and addresses of our ship and engine builders, of the purchasing agents of our principal lines, of 3,650 masters and pilots and over 5,000 engineers. It also contains statistics of shipping, giving the exports of different commodities by port. The volume is attractively bound in blue denim.

Poor's Manual of Railroads. Thirtieth annual number. New York: H. V. & H. W. Poor, 44 Broad street; octavo, 1408 pages. Price, \$7.50.

It is unnecessary to allude more than to all attention to the fact that Poor's Manual has again appeared, this volume giving statistics for the year ending with Dec.

31, 1896. In our issue of Sept. 3 we summarized some of the facts to be found in the introduction to the "Manual." From such inspection as we have made we do not discover any important changes in the make-up of the manual from last year. For the few of our readers who do not know Poor's Manual we may add that it is by all odds the most complete collection of information about railroads that is published anywhere in the world.

Cassier's Magazine for August is a beautiful "Marine number." There are 300 pages, profusely and handsomely illustrated, and besides there are 17 portraits of the distinguished gentlemen who contribute to this number. These include Sir William White, Sir Charles Dilke, Mr. Yarrow, Mr. Thornycroft, Mr. Oldham and other men well known for design or construction, or both, whose names have not yet become so famous as those we have just mentioned.

TRADE CATALOGUES.

The Cook Cooler Company, Ltd., Flint, Mich., has recently issued a pamphlet of 42 pages, 6 in. x 8 in., entitled "Hot Boxes: Their Causes and Cure." The various causes of hot boxes are enumerated, the action of the journal and brass when heated is described, as is also the manner in which hot journals are cooled by means of the Cook Cooler. The first few pages of this pamphlet were presented in the form of a paper before the St. Louis Railway Club by Mr. M. P. Cook, May 14, last. An abstract of this paper was published in the *Railroad Gazette*, July 16. The Cook Cooler consists essentially of a tank for water which, when in use, is swung by links from two hooks screwed into the under side of the car sills directly above the hot box. It is prevented from swinging outward by a chain. When not in use it is carried in the baggage car or caboose. The tank is connected by a flexible hose to a piece of pipe. The pipe which is placed inside the oil box is secured by clamps to the edge of the box and held in position so that the water is discharged upward under the edge of the brass on the opposite side of the axle from the way the train is running. The flow of water is regulated by a stop-cock; this is controlled by a lever in the shape of a clock-hand, which is placed on a dial and turns with the cock. Figures on the dial indicate the number of minutes in which the tank will be emptied for the several positions of the hand. The pamphlet gives a large number of letters from officers and trainmen of the Chicago & Grand Trunk, the Flint & Pere Marquette, the Chicago, Burlington & Quincy and the Chicago, Rock Island & Pacific, where Cook Coolers have been in use from one to two years. These show that the coolers have worked very satisfactorily.

A Map of the Pennsylvania System, mounted for hanging on the wall, has been issued by the Passenger Department of the Lines West of Pittsburgh. The map is the usual railroad map, showing the different railroads under Pennsylvania control, in lines which are nearly straight between important termini, and it must be an effective advertisement. Perhaps the most important part of the map, however, is its border, which takes up more than two-thirds of the 36 in. x 56 in. sheet. The map itself is more or less familiar, but the border is filled with illustrations of scenes on the company's lines which are not so familiar, at least not on so large a scale. The pictures are direct-process, from un-

usually fine photographs, most of them 6 in. x $7\frac{1}{2}$ in. Mr. Ford seems to have solved the problem of giving his advertising pictures a prominent place without going to the expense of furnishing frames for them. These 20 pictures are nearly as effective as though they were larger and were displayed in frames costing in the aggregate, say, \$5. A map mounted on rollers is pretty sure to be kept in a conspicuous place. It approaches a folder in cheapness and a framed picture in effectiveness.

The Illinois Steel Company has issued a 42-page book containing many half-tone illustrations, descriptive of the five steel plants operated by that company. The corporation known as the Illinois Steel Company was formed May 1, 1889, by the consolidation of the North Chicago Rolling Mill Co., the Joliet Steel Co. and the Union Steel Co. This brought under one control five plants as follows: North Chicago Works, established in 1857; South Chicago Works, established in 1880; Milwaukee Works, established in 1888; Joliet Works, established in 1870; Union Works, Chicago, established in 1863. This company also owns the controlling interest in the Chicago, Lake Shore & Eastern Railway, which connects the South Chicago Works with the various belt lines and other railroads which enter Chicago. The book describes each plant separately, including the location and the methods for handling materials, together with the various processes and the special machinery used in the manufacture of steel. The catalogue also contains much that is of interest to engineers and users of structural material. Copies can be obtained from the general offices of the company, The Rookery, Chicago.

The Sherzer Rolling Lift Bridge Company, with offices in the Unity Building, Chicago, has issued a $10\frac{1}{2}$ in. x $14\frac{1}{2}$ in. book of 22 pages bound in blue cloth, which is very handsome. The principal features of the different types of movable bridges are briefly mentioned in the opening pages, the larger portion of the book being taken up by full-page photogravures of existing rolling-lift bridges at Chicago, built under the patents of Mr. William Sherzer, C. E. These include the highway bridges at Van Buren street and the two bridges of the Metropolitan West Side Elevated Railroad over the Chicago River. Also, the highway bridge at North Halsted street crossing the North Branch of the Chicago River. This book would be carefully preserved merely on account of the artistic and expensive manner in which it is got up, but it has a greater interest and value because the bridges shown are of the most modern type.

Gould's Efficient Power Pumps and Applications of Gould's Efficient Power Pumps.—These two carefully prepared 6 x 9 in. catalogues, just published by the Gould Manufacturing Company, 16 Murray street, New York City, describe different styles of Gould's pumps and note some of their many applications. In the first-mentioned catalogue pumps for raising water from deep wells, vertical, centrifugal, triplex and suction pumps and numerous other types are illustrated and described in detail, while the second contains information regarding their uses, especially in large pumping stations. Among others the pumps driven by electric motors at the freight-house of the Chicago, St. Paul, Minneapolis & Omaha at Itasca, Wis., described in the *Railroad Gazette* some time ago, are referred to.

Portable Pneumatic Tools.—The C. H. Haeseler Co., Philadelphia, Pa., has issued a very attractive 6 x 9 in. catalogue descriptive of the portable pneumatic tools made by that company. For the most part the tools are shown by engravings reproduced from photographic views taken at various places where the tools have been in service. The Keller pneumatic stone hammers, the Phoenix pneumatic tool, and the breast drill, occupy the larger part of the catalogue; while the Phoenix pneumatic sand sifter, the straight lift pneumatic hoists and the Keller valveless hammers are each carefully described. In the last three pages is given a list of references showing that the pneumatic tool has found a place in a large variety of manufacturing interests, especially in stone cutting establishments.

TECHNICAL.

Manufacturing and Business.

The Sams Automatic Coupler Co., of Denver, Col., has been organized and incorporated under the laws of Colorado, with a capital stock of \$2,500,000. The directors of the new company are George E. Ross-Lewin, Arthur E. Jones, Frank L. Smith, George W. Cramer and Fred S. Bulkley.

The Colorado & Northwestern, a new narrow-gauge railroad being built between Boulder and Ward, Colo., 25 miles, is in the market for 56-lb. rails for the entire length of the road. E. C. Thompson, of Boulder, Colo., is President.

An advance of 10 per cent. in the wages of the 1,250 employees of the Pennsylvania Tube Works, Pittsburgh, went into effect Sept. 20.

The Michigan Peninsular car shops at Detroit will resume work at once in all departments that have been idle, the company having received orders sufficient to increase the force from 2,500 men to 3,500 for 30 days.

The report of the Southern Iron Committee on the movement of Southern iron for the month of August shows that 80,163 tons of pig and 11,196 tons of pipe had

been forwarded, and of this amount 9,088 tons were exported to Europe through the Southern ports and about half of that amount through Eastern ports. The movement for the month is 30 per cent. in excess for the same month last year.

The Benjamin Iron & Steel Co., Buffalo, N. Y., has for sale 1,500 tons of 56-lb. rail ready for favorable Southern delivery, 5,000 tons of 60-lb. for convenient delivery in the Eastern states and 2,500 tons of 70-lb. iron also for convenient delivery in the Eastern states.

McGill & Co., of Pittsburgh, Pa., recently made a shipment of 110 tons of steel and tube works machinery to the Nicopol-Maripol Mining & Metallurgical Co., Maripol, Russia. Shipments have also been made by this company of 150 tons of heavy machinery, including a hydraulic testing machine and cutting-off and straightening machine and a hydraulic billet shear, to the Homestead Steel Works, and a cold saw to the Edgar Thompson Steel Works.

The James Clark Co., of Baltimore, expects soon to build an extensive new plant, including a machine shop, blacksmith shop and boiler works. The main building will be 151 x 70 ft., to which will be added a building 153 x 63 ft., both buildings to be 48 ft. in height. Electric cranes and other modern devices will probably be used.

The Chicago Grain Door Co., Chicago, reports a very marked improvement in business. "Chicago" rabbeted grain doors and "Security" lock brackets are being used on 500 box cars now building by Wells & French for the Soo Line, and 500 box cars building by the Michigan-Peninsular Car Co. for the Canadian Pacific. Chicago grain doors were specified for the box cars recently ordered from the Pullman Co. by the Cleveland, Cincinnati, Chicago & St. Louis and the Chesapeake & Ohio; these orders were each for 1,000 cars.

The Ingersoll-Sergeant Drill Co. has just received an order from J. B. Macdonald and Andrew Onderdonk, contractors of the Jerome Park Reservoir, N. Y., for a large air compressor plant, duplicating the plant which they now have except that the plant ordered is larger and has both steam and air cylinders compounded. This reservoir will be about 3,800 ft. long and 2,800 ft. wide, and will be excavated to a depth of 33 ft. 6 in. It will be necessary to excavate 3,165,000 cu. yds. of solid rock. Almost every mechanical appliance is operated by compressed air. The original plant consisted of one Ingersoll-Sergeant duplex Corliss condensing air compressor, steam cylinders 24 and 44 x 48, two air cylinders 24 x 48 and rated at 540 H. P. with a pressure of 80 lbs. at the receiver; 14 drills, 14 hoisting engines and several pumps have been operated by the original plant exclusively by compressed air, and the additional plant will enable them to do all the work on that job by air power.

Stephen D. Barnett has been appointed Eastern Agent of the Kalamazoo Railroad Velocipede & Car Co. with headquarters in New York City.

It is reported that Mr. Thomas L. McKeen, General Eastern Agent of the Trojan Coupler Company, has tendered his resignation, to take effect at an early date.

The Biltmore Estate, Biltmore, N. C., is offering for sale one 36-ton Baldwin shifting locomotive, with 16 x 24 in. cylinders; one passenger locomotive, with 16 in. cylinders, one small Baldwin locomotive, with 7 x 12 in. cylinders and 28-inch drivers (3-ft. gage), and nine low-side gondola cars, 24-ft. long and 40,000 lbs. capacity, equipped with air and hand brakes and M. C. B. standard trucks.

The Berlin Iron Bridge Co., of East Berlin, Conn., has the contract for the new boiler-house which the New York Belting and Packing Co. is building at Passaic, N. J. The building will be fireproof, with brick walls and steel roof trusses covered with the Berlin Iron Bridge Co.'s patent anti-condensation corrugated iron covering.

The Illinois Car & Equipment Co., of Jersey City, has filed a certificate of incorporation with the Secretary of State. The capital stock is \$2,000,000, and it is said that the company will begin business with \$25,000. The incorporators include Edward M. Miller, 40 Wall street, New York; Noel Gale, Clifton, N. Y., and Robert S. Green, Elizabeth, N. J.

A new fire-proof hotel will shortly be erected at Bellefield, a suburb of Pittsburgh. Officers of the Carnegie Co. are interested, and Rutan & Russell, of Pittsburgh are the architects. There will be about 1,500 tons of structural work.

A six-story office block of fire proof construction is soon to be erected at the corner of Smithfield street and Sixth avenue, Pittsburgh, and will contain about 450 tons of steel. Alden & Harlow, of Pittsburgh, have prepared the plans.

J. H. Sternbergh & Son, Reading, Pa., are said to have received from Manchester, England, a large order for rods, bolts and nuts.

Iron and Steel.

The plant of the East Chicago Iron & Steel Co., at East Chicago, Ind., which has been in the hands of a Receiver for nearly two years, will be sold at auction Sept. 25, to realize on a mortgage of \$40,000. The plant consists of 13 double puddling and 11 heating furnaces, 5 trains of rolls and 5 hammers. The works were built in 1889 by the National Forge & Iron Co. The rolls are 18 in. muck, 18 in. scrap bar, and 18 in., 10 in. and 8 in. finishing. The hammers range from 50 lbs. to five tons, are served by 10 forge fires, and were used to make car axles

and general forgings. The rolling mills ran on merchant bars exclusively.

The Birmingham Rolling Mill, of Birmingham, Ala., resumed operation on Sept. 13 in its old puddling department, which has been idle more than three years. This gives employment to more than 300 puddlers and rollers, and the entire number of employees at the mill is now over 1,500.

Messrs. Topp & Craig, of Pittsburgh, are preparing plans for the new furniture store of Edmundson & Perrine of that city. Some 600 tons of structural steel will be used.

The Soho furnace, Pittsburgh, was blown in last week, having been shut down for over two years by Laughlin & Co. It will run double turn on Bessemer iron and employ from 150 to 200 men.

The Dennison Rolling Mill Co., of Dennison, O., expects to have its new plant in operation by Oct. 15. The output annually will be about 50,000 tons of steel, to be used for roofing, ceiling, stove pipe, coal hods, tin plate and all sheet-metal products. Three engines are being put in. The P., C., C. & St. L. Railroad has constructed a side track to the factory. The main building is 105 ft. x 140 ft. and the annex 50 x 40, all steel.

The mill of the Tidewater Steel Co., of Chester, Pa., which has been leased by the operators of the Chester Pipe & Tube Mill, was started last week and began again to roll steel plates. This plant has been idle for the past four years. The business of the two concerns will be under the supervision of Capt. W. S. McManus.

But one of the Henry Clay furnaces has been running the past year, and the other has just been started, and both are now running to their full capacity and are turning out about 125 tons of iron per day. It is being shipped as fast as turned out, and indications are that the furnaces will run steadily for some time to come.

The Mahoning Rolling Mill, of Danville, which last week passed into the hands of Mr. F. P. Howe, of Philadelphia, will continue to make structural iron tubing. Mr. R. K. Polk, of Danville, will be Superintendent of the mill under the new management. In the near future the puddle mill will be put into operation, while the foundry and machine shop will probably continue in the hands of Curry & Vannan.

The Cullen Brothers & Lewis Steel Co., of East Orange, N. J., has been incorporated with a capital stock of \$500,000, to make iron and steel. The incorporators are Solomon and Joseph H. Lewis, of Hoboken, N. J., and Charles M. and Andrew Cullen, of New York.

The new Rosena furnace of the Oliver & Snyder Steel Co., of Pittsburgh, at New Castle, Pa., built to replace the one destroyed by an explosion on May 23 last, is ready for blast. It is 20 x 100 ft., and will have a capacity of about 400 tons of Bessemer pig iron a day. The hearth is 13 ft. in diameter. The plans for rebuilding the furnace were prepared by George W. McClure & Son, Pittsburgh, Pa. The steel work was done by the Enterprise Boiler Co., of Youngstown, O., who sublet the contract for the plain material to Park Brothers & Co., Limited, of Pittsburgh.

The Aliquippa Steel Co., of Aliquippa, Pa., will enlarge its plant by adding some new mills and rollers. The La Belle Iron Works, of Wheeling, W. Va., has been awarded the contract for furnishing the new apparatus.

The Totten & Hogg Iron & Steel Foundry Co., of Pittsburgh, has placed an order with the La Belle Iron Works, of Wheeling, W. Va., for two additional hot mills, complete, for its new mill.

Hannah Furnace, of the Mahoning Valley Iron Co., at Youngstown, O., is ready for blast. A new 7-in. mill has been put in, made by the Pomeroy Machine Co., of Pomeroy, O. In connection with improvements to the furnace, ore bins have been provided giving about three times the old storage capacity.

Thomas Sharp, of Nashville, and others who are interested in the Spathe Iron Co., of Lawrence County, Tennessee, have concluded a deal for the purchase of the Vanderbilt furnace at East Birmingham, Ala.

The Bell City Malleable Iron Co., of Racine, Wis., has completed an ore smelting furnace, and plans have been given out for bids on a foundry 150 x 85 ft., with new core and jannanning ovens.

It is stated that the Palmer Hardware Co has purchased the foundry of the Empire Forge Co., of Lansingburg, N. Y., which the new owners intend to put into immediate operation.

The Carnegie Steel Co., Limited, Pittsburgh, Pa., will add 10 new open-hearth furnaces to the Homestead Steel Works, some contracts for equipment having already been let. The furnaces will be of 40-ton capacity and will furnish metal for the entire Homestead Steel Works, all the product of which will be rolled eventually from open-hearth steel. A new rolling mill will also be built. A short distance from the site of the new furnaces there is now being built a large fitting shop for girder rails, the making of which will be begun on an extensive scale early in the coming winter. The 33 in. finishing mill will be remodeled for making these rails. All sheet bars will be rolled at the Duquesne Steel Works.

New Stations and Shops.

The Baltimore & Ohio intends to build a new station at Wheeling, W. Va., but nothing has been done, except that plans have been drawn for the guidance of contractors in making bids.

The Atchison, Topeka & Santa Fe is building a number of new structures, some of which are about finished. The following is the list of the new buildings, with brief description of each: Station at Nickerson, Kan., 84 ft. 1 in. x 20 ft. 3 in., one story high, to replace one recently burned. It will be of wood. Combined station and hotel at Dodge City, Kan., 36 ft. x 255 ft., two stories high, with basement under hotel part; built of red pressed brick, with lava rock stone and terra cotta trimmings. The roof is of red Spanish tile, and the entire building is heated by steam and lighted by electricity, and contains all the latest improvements in sanitary plumbing and ventilation. Station at Hutchinson, Kan., 37 ft. x 113 ft., one story high, of red pressed brick with Colorado sandstone and terra cotta trimmings. The roof is of slate and the building is heated by steam and provided with electric light. Station at Winfield, Kan., 35 ft. x 103 ft., one story high, of red pressed brick, with stone and terra cotta trimmings. The roof is of galvanized steel shingles and the depot is heated by steam and lighted by electricity throughout. Station at Purcell, I. T., 24 ft. x 114 ft., two stories high and built of frame with a shingle roof. The building contains also an eating house, as well as reading and bath rooms, and will be heated either by steam or hot water. Grain elevator at Winfield, Kan., in connection with corn-shelling house, with a capacity of 115,000 bushels of wheat and 6,000 bushels of corn. The machinery is of the latest pattern and complete for transfer business. Machine shop at Newton, Kan., 112 ft. x 220 ft., with a boiler-house annex 30 ft. x 60 ft. The entire building is built of brick with composition roof, and has a large skylight over the shop. Roundhouse at Argentine, Kan., with 18 stalls. The exterior walls are of stone and the roof of composition material. Car repair shops at Topeka, 144 ft. x 793 ft., built of frame-work and covered with a composition roof. The exterior walls are of corrugated iron.

The contract for building the new station of the Cleveland Terminal & Valley Railroad at Cleveland, O., has been awarded to C. N. Griffin, of Cleveland. It will be 100 x 43 ft., three stories high, with a tower in the center. Rock-faced blue sandstone will be used for the first story and buff compressed brick with stone trimmings for the rest of the building; the roof will be tiled. The second and third floors will be used for offices by the Cleveland Terminal & Valley Railroad. The new station is located just east of the present station at the foot of South Water street, on Canal street, and will be used jointly by the Cleveland Terminal & Valley and Cleveland, Lorain & Wheeling roads. It will be lighted by electricity and furnished with an electric elevator.

The improvements at the Mt. Clare shops of the Baltimore & Ohio Railroad, which have been in progress for about six months, are being rapidly completed. It has been decided to light the works by electricity and the necessary apparatus is being installed. The new shaving tower adjoining the sawmill has been completed and all through the shops the apparatus has been placed in service for drawing the shavings into the furnace. The erecting shop has been finished and supplied with two large traveling cranes driven by electricity. Every department has been running on full time and there are now 1,700 men at work. Over 400 freight cars have been repaired at the shops in the last month and five new engines have been completed and a number of others are being built.

The improvement in the Sharon yards of the Erie & Pittsburgh Railroad are nearly completed.

The Penn Bridge Co., of Beaver Falls, Pa., has been awarded a contract for the extension of the construction shops at the Port Royal Navy Yard, S. C., a bid of \$6,350 being the lowest.

The Schoen Pressed Steel Co., Pittsburgh, is doubling the capacity of its plant at Allegheny, Pa., by three steel buildings with the following dimensions: 350 x 90 ft., 400 x 120 ft. and 600 x 120 ft. The new buildings will be supplied with machinery of the most modern design, including several hydraulic presses and electric cranes. When these additions have been completed this company will have a capacity for turning out 500 tons of pressed steel shapes a day.

Interlocking.

The National Switch & Signal Company has closed a contract with the Elgin, Joliet & Eastern for an interlocking plant near Hammond, Ind., at the crossing of the Elgin, Joliet & Eastern and the Chicago Terminal Transfer Company. There will be 16 working levers for the operation of 6 derrails and 6 facing-point locks. No switch and lock movements will be used, and each facing-point lock will be bolt locked by the high signals.

Interlocking signals are to be put in at the crossing of the Missouri Pacific and the Atchison, Topeka & Santa Fe at Fifteenth street, Topeka, Kan.

The Standard Railroad Signal Co., Arlington, N. J., has the contract for putting up a 17-lever interlocking machine for the Philadelphia & Reading at Schuylkill Colliery, Pa.

The National Switch & Signal Co. has closed a contract with the Chicago, Rock Island & Pacific for an interlocking plant near Davenport, at the crossing of that road with the Burlington, Cedar Rapids & Northern. The machine will have 15 working levers.

The Union Loop, Chicago.

The Union Loop, Chicago, is rapidly nearing completion. The tracks and electrical connections are in place on the main structure, and the work of erecting the stations and installing the signal apparatus is progressing

rapidly. Nothing has so far been done toward the connection with the South Side Elevated, but the Lake Street Elevated connection is finished, and that of the Metropolitan West Side Elevated is under way. An informal inspection trip around the Loop was made by the officers of the road Monday, Sept. 6, this being the first train to make the complete circuit. The date for opening the road for general traffic has not yet been announced, but it is expected that it will be used by the Lake Street and Metropolitan trains before Oct. 1.

100-lb. Rails.

The Illinois Central Road will, in the near future, begin to lay 100-lb. rails for four miles on the Calro Bridge and approaches, and will continue to use the heavy rails on its main line between the Ohio River and Chicago. As this main line track has, however, been laid with 75-lb. rails within the last few years, it will not be necessary to renew much of it for some time.

Improved Furnaces and Automatic Stokers.

As a supplement to, and in conclusion of, the extended discussion of the subject of the Smoke Nuisance with especial reference to Philadelphia, which took place at the stated meetings of the Franklin Institute in April and May, the Committee on Meetings has extended an invitation to manufacturers and inventors of improved furnaces and automatic stoking devices to present at the September meeting a brief description of the construction and operation of their respective devices, and a statement of claims for efficiency. The following is a list of those who have signified their intention to participate, viz.:

Murphy Iron Works, Detroit, Mich., manufacturers of the Murphy automatic smokeless furnace.

McKenzie Furnace Company, Chicago, Ill., manufacturers of smokeless furnaces.

American Stoker Company, Dayton, O., manufacturers of the American stoker.

Wm. Sellers & Co., Inc., Philadelphia, manufacturers of the Vickers automatic stoker.

Westinghouse, Church, Kerr & Co., New York, manufacturers of the Roney mechanical stoker.

The Hutchinson furnace will be described by Mr. C. Wolesley Cox.

The Hawley Down-Draught Furnace Company, Pittsburgh, Pa., manufacturers of the Hawley down-draught furnace.

The Wilkinson Manufacturing Company, Philadelphia, manufacturers of the Wilkinson stoker.

The Babcock & Wilcox Company and the Cox Iron Manufacturing Company, of New York, and others.

Pig Iron Production in August.

The *Iron Age*, in its monthly review of the production of pig iron, notes a sharp increase in current production due partly to a larger output of active furnaces, but principally to the starting of a number of large furnaces. A number of small stocks were blown out. Preparations are being made to resume work at a number of other plants, so that a further notable growth in output can be looked for during this month. The Central West section is responsible for nearly the whole of this movement. On Sept. 1 161 furnaces were in blast, with a weekly capacity of 185,506 gross tons, against 152 furnaces in blast Aug. 1, with a capacity of 165,378 gross tons and against 140 furnaces in blast Sept. 1, 1896, with a capacity of 129,500 gross tons. The figures for the past month are the highest since May 1 of last year, when the number of furnaces in blast were 196, with a weekly capacity of 189,398 gross tons. Stocks, sold and unsold, Sept. 1, aggregated 869,110 tons, against 933,958 tons Aug. 1.

The Soudan Railroad.

In the *Railroad Gazette* of Aug. 13 there appeared a somewhat detailed account of the extension of the Soudan Railroad, which has been carried on the last year or so in connection with the expedition for the reconquest of the Soudan. With that account was also a sketch map, which will make the situation clearer to the reader. It appears now that work is being very actively pushed in extending this railroad directly across the desert from Wady Halfa to Abu Hamed, a distance of about 250 miles. Such a line would cut off the great bend of the Nile which sweeps around by Dongola and save many miles over a route following the Nile. It has always been believed, however, that a railroad across the desert would be very difficult to work for want of water, as the only water supply heretofore known was a group of wells about midway furnishing a small quantity of brackish water. It is now said that the working party has found a new and copious supply of water about midway. Of course there is no fuel, but aside from these difficulties of want of water and of fuel the project is easy. The surface of the desert is mostly hard gravel and very level and smooth, and the work of laying a track is light. It is said that 3,000 men are now engaged in this work and that two miles of track have been laid in a day.

THE SCRAP HEAP.

Notes.

The Lehigh & Hudson River has advanced wages of employees 5 per cent., restoring what was taken off about a year ago.

The Houston (Tex.) Post states that the Southern Pacific is now running passenger engines through from Houston to New Orleans, 362 miles.

Press dispatches report that the severance of through traffic relations between the Union Pacific and the Oregon Short Line will, this month, be further carried out by the discontinuance of some of the through train service via Granger.

On July 26, the Black Diamond Express, of the Lehigh Valley Railroad, ran from Falling Spring to Manchester, 172 miles, in 180 minutes. The train made two stops

of five minutes each, and one of eight minutes, making the net running time 162 minutes and the rate 64 miles an hour.

On Sunday, Aug. 29, a special passenger train of the Cleveland, Cincinnati, Chicago & St. Louis consisting of seven passenger cars and one baggage car, ran from Mattoon, Ill., to Granite City, 128 miles, in 121 minutes. Three stops were made. The engine was No. 109 and it was run by C. C. Reding.

Philadelphia papers report that the Pennsylvania Railroad Company has contracted for the laying of a pneumatic tube from the General Post Office at Ninth and Market streets in that city to the Broad Street Station, to be used for conveying United States mails. The diameter of the tubes will be 8 in.

The long-drawn-out strike of the bituminous coal miners is now looked upon as settled, the convention of miners at Columbus, O., last week having voted to accept 65 cents in the Pittsburgh district. It was voted not to resume work for 10 days, but it is thought that many mines will be opened before that time. There is still some dissatisfaction in West Virginia and in Illinois. The comparatively small strike in the anthracite region culminated at Hazleton on Sept. 10 in such riotous behavior that a force of deputy sheriffs fired on a mob and killed more than 20 persons. Since then there has been no serious outbreak, but the strike has spread considerably.

The Attorney General of the state of Washington, reporting on the complaint of a grain dealer of Tacoma concerning excessive grain rates over the Oregon Railway & Navigation Company's railroad, says that the law passed by the last Legislature, prescribing maximum rates for freight, is ineffectual for lack of a penalty clause. If one railroad is dissatisfied with the treatment, which it receives from another it may proceed under the law to get reparation, but neither the state nor an individual shipper has any remedy, except as before; that is, at common law. The Attorney General suggests, however, that the station agent who demanded the rates in excess of those provided by the statute may be indicted on application of the County Attorney.

New Train for the St. Paul.

In our issue of June 4 last we illustrated the new vestibuled train of the Chicago, Burlington & Quincy, which was put in service during the month of June between Chicago and St. Paul and Minneapolis. This train was intended to equal, if not excel, the service given by the passenger trains run between the same points by the Chicago & Northwestern and Chicago, Milwaukee & St. Paul. The Chicago, Milwaukee & St. Paul is now having built by the Barney & Smith Car Mfg. Co., Dayton, O., two new trains, in which the interior decoration and finish will be very handsome. Each train will consist of an express car, a buffet, smoking and library car, a compartment sleeper, two sleeping cars, a day coach and a smoking car. The trains will be lit by electricity and be supplied with all the latest appliances.

A Railroad Concession in Colombia.

An American organization has recently secured a concession from the United States of Colombia giving valuable commercial privileges. It gives the right to navigate the Magdalena River and to build a railroad across the country southward from a point 250 miles from Bogota. A railroad 28 miles long from Bucaramanga, a city of 50,000 inhabitants and the capital of the State of Santander, to Pie de Cuesta, a town of 12,000, in the direction of Bogota, is contemplated. This will be the most important part of the road which is proposed, between Puerto Wilches, 200 miles from the mouth of the Magdalena River, and Bogota, as it goes through the only available pass in the mountains. The gage of the road will be one meter, and it is believed that the grades will not need to exceed 2.2 per cent.

The Armour Institute.

The Armour Institute of Technology, Chicago, opened on Sept. 16, and at the present rate of enrollment it is expected that last year's attendance of 1,100 will be much exceeded. About 100 graduates from the city schools have passed examinations for admission to the scientific academy, and 30 school graduates enter the freshman class of the technical college. Entrance examinations last week were well attended, the applicants representing 20 states and territories.

New York State Canal Contracts.

On Sept. 8 Superintendent of Public Works Geo. W. Aldridge awarded the following contracts for work on the Erie Canal: Improvement between Locks 29 and 30, to Thomas H. Karr, of Troy, at \$9,122. Improvement of about seven miles from Lock 45 to the east line of Oneida County, to J. V. Quackenbush, of Mohawk, at \$181,998. Improvement from Locks 19 to 20, to Thomas W. Karr, of Troy, at \$65,812. Improvement between Locks 24 and 25, to Bauer & Hagaman, of Rochester, at \$97,301. Improvement between Locks 25 and 27, to Troy Public Works Co., of Utica, at \$132,678. Improvement between Locks 40 and 41, to Clinton Beckwith, of Herkimer, at \$53,000. Improvement between Locks 41 and 42, to J. V. Quackenbush, at \$59,290. Improvement between Locks 39 and 40, to Clinton Beckwith, at \$69,829. Improvement from a point 1,000 ft. west of Hurd's bridge, a distance of 8½ miles to the foot of the Lockport Locks, to Furnaceville Iron Co., of Rochester, at \$165,800. Improvement from Shelby Basin bridge to within 1,000 ft. west of Hurd's bridge, a distance of six miles, to Baker & Banker, of Gloversville, at \$98,760. Improvement from 700 ft. west of Lang's bridge to Shelby Basin bridge, 8½ miles, to Williams, McNaughton & Hapst, of Buffalo, at \$184,095. Improvement from Brailey's bridge, westerly to 700 ft. west of Lang's bridge, 6 miles, to Furnaceville Iron Co., at \$111,000. Improvement from 1,000 ft. east of Holley bridge to Brailey's bridge, 8½ miles, to Furnaceville Iron Co., at \$135,500. Improvement from Cooley's Basin bridge to a point 1,000 ft. east of the Holley bridge, 6½ miles, to Furnaceville Iron Co., at \$110,100. Improvement from a point east of Norman's bridge to Cooley's Basin bridge, 6 miles, to Furnaceville Iron Co., at \$87,000. Improvement from Rome street bridge, Rochester, to 600 ft. east of Norman's bridge, 8 miles, to Henry C. Allen & Co., of Syracuse, at \$105,850. Improvement from head of Lock 66 to Rome street bridge, Rochester, 4½ miles, to Whitmore, Rauber & Vicinus, of Rochester, at \$159,695. Improvement from head of Lock 62 to head of Lock

66, 5 miles, to Whitmore, Rauber & Vicinus, at \$88,595. Improvement from point 100 ft. west of New Boston road bridge, to a point 100 ft. west of Kirkville road bridge, 7 miles, to E. H. Gaylor, of Fayetteville, at \$147,582. The above contracts nearly complete the work contemplated under the \$9,000,000 general canal improvement appropriation. The contracts for several pieces of work for which bids have been opened are still unawarded.

LOCOMOTIVE BUILDING.

The Kansas City, Pittsburgh & Gulf is asking for bids on 30 locomotives.

The Wabash is in the market for locomotives, and the number ordered will probably be 25.

The Kansas City Suburban Belt Railroad has ordered two Baldwin, six-wheel, 60 ton switchers. The cylinders will be 19 x 24 in.

The Brooks Locomotive Works has just completed the special mountain locomotive for the Mexican Central Railway. This is said to be the largest engine ever built at the Brooks Works.

The Colorado & Northwestern, a new narrow gage railroad now being built from Boulder to Ward, Col., 25 miles, is asking bids on one passenger and three freight engines. E. C. Thompson, of Boulder, Col., is President.

The Brooks Locomotive Works have sold to the Colorado & Northwestern Railway one 15 x 32-in. mogul type locomotive, weighing 70,000 lbs. The engine is of 36-in. gage and intended for freight and passenger service.

As stated Sept. 3, the Chicago & Eastern Illinois has closed a contract with the Pittsburgh Locomotive Works for five freight locomotives. These will weigh 172,000 lbs. each. The cylinders will be 20 x 26 in. and the firebox 10 ft 6 in. in length and the boiler will have 320 flues and will be built for a working pressure of 200 lbs.

The Missouri Pacific will soon order 25 locomotives, specifications for which are being prepared in the office of the mechanical engineer of that road, but the contract has not yet been let. The same company is said to have placed an additional order for 500 box cars of 60,000 lbs. capacity with the Missouri Car & Foundry Co. This will make a total of 1,000 cars ordered by this road from the same company, the former order being mentioned in our issue of Aug. 6.

CAR BUILDING.

The Norfolk & Western is building 50 stock cars and 15 poultry cars at its Roanoke, Va., shops.

The Topeka Capital states that an order has been issued for 100 box cars and 200 coal cars for the Santa Fe Railroad.

We are informed that the Louisville, Evansville & St. Louis has not yet determined upon ordering 200 freight cars, as has been recently reported.

The Southern Railway is in the market for a number of freight cars. It is stated that an order may soon be placed for 800 box and 700 coal cars.

The Pennsylvania Railroad expect to build 25 standard dairy product cars at the Fort Wayne shop. These will be similar to those that have been built heretofore.

The Harlan & Hollingsworth Co. have completed the 200 gondola cars for the Wilmington & Northern Railroad. The order was given the middle of April last.

The Cincinnati, Portsmouth & Virginia has placed an order for 50 box cars with the Ohio Falls Car Mfg. Co. These cars are to be equipped with Security car doors.

The Pittsburgh & Lake Erie, which has been asking for bids on 100 box cars, has increased the number to 200. Security car doors, made by the National Specialty Co. are specified.

The Colorado & Northwestern, a new narrow-gage railroad (referred to in the Locomotive Building column) is asking bids on 100 ore, 20 box, 20 flat, 20 gondola and 4 passenger, and 2 combination cars.

Swift & Co. has placed an order for 300 refrigerator cars with the Michigan-Peninsular Car Co., at Detroit. This is in addition to the order for 50 placed with the same company and noted in our issue of August 13.

The 1,000 box cars ordered from the Pullman's Palace Car Co. by the Chesapeake & Ohio, will be 35 ft. long, and equipped with Tower couplers, Westinghouse air-brakes, National hollow brakebeams and Chicago metallic roofs.

The Washington Coal & Coke Co. have just received 100 new gondola cars of 60,000 lbs. capacity from the Barney & Smith Car Co., Dayton O. These are similar to those purchased from the same company about two years ago, and are fitted with Tower couplers, National hollow brake beams, air brakes, etc.

In our issue of Aug. 27 we noted that the Northern Pacific is building 100 twin hopper coal cars of 700,000 lbs. capacity at its South Tacoma shops. They will be 30 ft. x 8 ft. 8 in. over sills, with American cast-steel body and truck bolsters, the latter on roller bearings of the Barber type, the trucks being of iron and steel construction. The cars will be equipped with Westinghouse air-brakes, Kewanee brakebeams, Washburn couplers, Northern Pacific standard drawbar attachments, four-coil bolster springs, 4½ x 8 in. journal bearings and 33-in. cast-iron wheels.

BRIDGE BUILDING.

Beaver Falls, Pa.—A committee consisting of Fred Barker, Robert McClain and Alex. Smith has been appointed by the Directors of the Brighton Bridge Co. to consult with an engineer and have plans and specifications prepared at once for a new iron structure to replace the present Brighton bridge. This structure is the only highway bridge between this place and New Brighton, and it is proposed to spend about \$100,000, it is said, on the new iron one.

Boston, Mass.—The Boston Transit Commission was given a hearing by the Massachusetts Railroad Commissioners on Sept. 7 regarding its petition to build the new Charles River bridge at a height of less than 18 ft. above the Fitchburg Railroad tracks. The plans of the Transit Commission provide that the railroad tracks leading to the Hoosac tunnel docks shall be lowered 14 in., and that the approach to the new bridge shall pass over them at the height of 16 ft. Chief Engineer Melcher of the Fitchburg has agreed to the plans. Chairman George G. Crocker of the Transit Commission urges immediate action, as the city is ready to ask for bids next week. The Commission, according to Chairman Sanford's statement, will issue an order permitting the building of the bridge according to these plans. This bridge, which will extend from City Square in Charlestown to Causeway street in Boston, will accommodate the tracks of the Boston Elevated railroad.

Boulder, Col.—The Colorado & Northwestern, a narrow gauge railroad now being built between Boulder and Ward, Col., 25 miles, has sent out specifications for six steel bridges 50 ft. long. J. L. Frankenberger, of Boulder, Col., is Chief Engineer.

Brainerd, Minn.—Bids are asked Sept. 23 for the repair and rebuilding of the bridge over the Mississippi River, at Laurel street. The bids are asked on the superstructure complete and three river piers, and on the substructure, except the three river piers, and comprising 28 piers and two abutments, all of stone and concrete. Plans and specifications can be seen at the office of the County Auditor, and also at that of C. F. Loweth, C. E., St. Paul.

Chicago, Ill.—Bids are asked Nov. 3 by the Sanitary District of Chicago for the sub-and superstructures of several bridges across the drainage canal. The bids to be on plans and specifications furnished by the Sanitary District unless competitive plans submitted shall prove, in the opinion of the engineer of the district, more acceptable and economical. Thomas Kelly, President Board of Trustees.

Cincinnati, O.—Bids are asked by the Board of County Commissioners Oct. 2 for building a wrought-iron truss bridge over Taylor's Creek at Fowler crossing. E. L. Lewis, County Auditor.

Easton, Pa.—The County Commissioners have awarded the contract for a new iron bridge over Jacobus Creek, in Upper Mt. Bethel township, to the Keystone Construction Co., of this city, for \$398.

Framingham, Mass.—The contract for the steel plate girder bridge, bids for which were received by J. J. Van Valkenburgh Sept. 1, has been given to the Boston Bridge Works at \$2,777.

Moorehead, Minn.—The Northern Pacific has decided to build a new steel bridge across the Red River at this point, and work, it is said, will be begun at once.

New York.—The contract for a steel-beam bridge with abutments on Brook avenue, at the Port Morris Branch Railroad, has been given to Stephens & O'Rourke, 44 Broadway, New York, at their bid of \$49,979. The other six bids received Sept. 2 by L. F. Haffen, Commissioner of Street Improvements, on the same work, ranged from \$66,793 to \$84,442.

The same firm has also received the contract for the extension of Pelham avenue bridge, bids for which were also received Sept. 2, at \$11,133, other bids ranging from \$12,399 to \$14,181.

Niagara Falls, N. Y.—The official opening of the Grand Trunk's new steel arch bridge over the Niagara River will take place Sept. 23. It is to be celebrated by festivities, lasting three days.

Norristown, Pa.—Viewers have taken testimony in the matter of the needs of a new bridge over Saw Mill Run from Green to Arch streets. It will cost from \$13,000 to \$18,000.

Pottstown, Pa.—The jury appointed on the bridge at King and Manataway streets has recommended that a one-span iron bridge, 80 ft. long and 60 ft. wide, with approaches, be built.

Pottsville, Pa.—It is proposed to repair the Washington Street Bridge at an outlay of \$5,000.

Quincy, Ill.—The Chicago, Burlington & Quincy has given the contract for a nine-span bridge over the Mississippi River at this place. The bridge will be 1,800 ft. long, with spans of 150, 200 and 250 ft. long.

Riverton, N. J.—The contracts for two new bridges, one to be built over Pompass Creek and the other over Swede's Creek, between this place and Riverside, have been let by the Burlington County Board of Freeholders to the Groton Bridge Mfg. Co. at their bids of \$1,028 and \$857, respectively.

Shamokin, Pa.—The contract for building the superstructure of the new overhead bridge at Cameron colliery has been awarded to the King Bridge Co. at \$11,400, and that for the substructure to J. R. Kauffman, of Sunbury, for \$13,165. Other bids for the iron work were Brockton Bridge Co., \$11,800; Pittsburgh Bridge Co., \$11,900; Toledo Bridge Co., \$12,500; Penn Bridge Co., \$11,995. For the stone work the other bids were: G. W. Keifer, \$13,965; Peter Keifer, \$14,745; Peter Barr, \$13,977; Smith & Champion, \$17,350; Benjamin Zerbe, \$13,355.

Williamsport, Pa.—The Grand Jury recommends the erection of a new iron bridge over Little Muncy Creek, from Rock Road to the road leading to Hughesville, at a cost not to exceed \$1,000, and also recommends the building of bridges over Jacob's Run, in Brown Township, and on Mill Creek, in Upper Fairfield Township.

Youngstown, O.—The contract for the superstructure of the Market street viaduct has been given by the County Commissioners to the Youngstown Bridge Co. at its figure of \$169,350 on plan E. I. Niedermeier & Restle got the contract for the substructure at prices aggregating about \$20,000 in all.

RAILROAD LAW—RECENT DECISIONS.

In an action, decided in the United States Supreme Court, to eject a railroad company from a part of its right of way, under a claim of superior title, it appeared that the land in dispute was formerly part of a tract of public land which had been opened to private acquisition, subject to the provisions of an act of Congress. The person from whom the title of the railroad company was derived had entered upon the land in question and had done everything required by the act to entitle him to a patent thereof except that through oversight the land so located was improperly described and registered in the land office. The plaintiff having, with knowledge of

these facts, obtained a patent of the land in controversy, it is held that the railroad company was the equitable owner, as grantee of the original locator, and that the plaintiff might be compelled to convey the legal title to it (decided in the U. S. Sup. Ct., May, 1897).¹

In a case decided in the United States Supreme Court on appeal from a decision rendered against a railroad company, on a complaint to the Interstate Commerce Commission for violation of the Interstate Commerce act, it appeared that the railroad company furnished free cartage of freight coming from points east of Detroit between its station and the business houses of consignees in Grand Rapids, Mich.; that it was a shorter distance from Detroit to Ionia than from Detroit to Grand Rapids, and that free cartage was not furnished consignees at Ionia, although the same rate for transportation of freight was charged in the case of both cities. It was decided by the commission that this discrimination was equivalent to charging a greater compensation for the transportation of like kinds of property for a shorter than for a longer distance over the same line, in the same direction, and was therefore in violation of the long and short haul clauses of the act, and the railroad company was ordered to desist from furnishing such free cartage. In affirming a decision setting aside this order, the Supreme Court holds that a long and short haul clause applies only to carriage by rail and that when freight was discharged from the company's cars at the city of its destination, without any lesser charge for the longer haul, the obligation of the company was fulfilled, and that it was no violation of the act to furnish the free transportation complained of (U. S. Sup. Ct., May, 1897).²

The Federal Court holds that although an employee who has knowledge of a rule made by a railroad company for his direction is under obligation, as a matter of law, to fully conform to such a rule, so long as it is really maintained in force, and if he fails to do so, is guilty of such negligence as will defeat his right to hold the company liable to him for any injury sustained by reason of such failure; when such a rule has been habitually disregarded by the company's employees, with the knowledge of the superintendent charged with the duty of enforcing it, it will be presumed that the rule has been abandoned and the company cannot take advantage of it (C. C. A., 6th Cir., May, 1897).³

In Oregon a receiver of a railroad was appointed in a suit to foreclose a mortgage on the road. The assets of the road were found insufficient to pay the wages of the workmen employed by him, as such receiver, and an application was made to the Court for an order requiring the mortgagee to provide for the payment, the contention being that, since the receiver was appointed for the purpose of the foreclosure, he had acted as the agent and representative of the mortgagee in employing the workmen. The Court holds that the mortgagee was not liable to pay wages (Sup. Ct., May, 1897).⁴

The constitution of Indiana provides that in certain enumerated cases and "in all other cases, where a general law can be made applicable, all laws shall be general and of uniform operation throughout the state," and also that "corporations other than banking shall not be created by special act, but may be formed under general laws." In 1897 the state legislature passed an act to amend its general law for the incorporation of street-railroad companies by adding a proviso that in cities having more than 100,000 population the rate of fare should not be more than three cents. There was only one city in the state having so great a population. It is held in the Federal Court that the act was special and local, and therefore unconstitutional and void (Circ. Ct., Indiana, April, 1897).⁵ Since the effect of this statute, if enforced, would greatly diminish the value of the security of the holder of an existing mortgage on the road, it is also declared to be void as being in contravention of the provision of the Federal Constitution which prohibits the passage of any "law impairing the obligation of contracts."

In the Federal Court it is held that for a shipper on a freight train to attempt to get on top of a box car next to the caboose, for the purpose of walking over the tops of the cars to the car containing his shipment while the train is in motion, is manifestly dangerous; and he cannot recover for a resulting injury, unless it is clear that it was necessary for him to do so (C. C. A., 4th Cir., May, 1897).⁶

In the Federal Court it is held that a railroad employee who starts upon a trip on a handcar on his own business or pleasure assumes the risk of injury from a train, which he knows to be due, and cannot recover against the company for an injury received while attempting, at the order of the foreman, to get the handcar off the track in the immediate presence of the approaching train, as he obeys such an order at his own risk. The conductor and engineer of a railroad train are declared to be fellow servants with an employee riding upon a handcar with which a train collides, so that he cannot recover damages for an injury resulting from their negligence (Circ. Ct., W. D., North Carolina, April, 1897).⁷

In Colorado it is held that a railroad rule requiring employees to examine the coupling apparatus and not make a coupling if anything is in a dangerous condition, and enjoining upon them the use of the utmost care in making such an examination, was not violated by a brakeman, who, observing, as he was about to make a coupling, that the link would not enter the drawhead of the standing car, immediately desisted from the attempt, started to go from between the cars, and was struck in the eye by a sliver of iron detached by their contact, and the company was liable to him, even though the injury was caused by the defective condition of a foreign car (Sup. Ct., March, 1897).⁸

In an action decided by the Federal Court, to recover damages for alleged overcharges upon interstate shipments of freight, the right of action being based upon the provisions of the interstate commerce act, it is held that the right to sue for such damages is not confined to the person or corporation suffering the damage in the first instance, but inures to the benefit of an assignee, there being no express statutory prohibition forbidding the assignment of such a claim (Circ. Ct., N. D. Iowa, April, 1897).⁹

The Federal Court has decided, in an action to recover damages for death resulting from the negligence of a railroad company, that the application of the rule fixing the responsibility of a master for the acts of fellow-servants is governed by the law of the place where the cause of action arose, not by that of the place where suit is brought, although the contract which created the relation of master and servant was made in the latter place. It further decides that a right of action given by the statutes of Canada to the widow and children of one who has been killed in that country through the negligence of another may be prosecuted to judgment by them in the courts of Vermont, though the corresponding statute of that state gives the right of action only to the administrator of the deceased (C. C. A., 2d Cir., April, 1897).¹⁰ If this case had been tried according to the law of Vermont, the plaintiff could not have recovered damages, by reason of the fact that the negligence

that caused the accident was that of a fellow-servant of the deceased.

- ¹ Hedrick v. A. T. & S. F. et al., 17 Sup. Ct., 922.
- ² Interstate C. Comm. v. D. G. H. & M., 17 Sup. Ct., 936.
- ³ I. E. & W. v. Craft, 80 Fed., 483.
- ⁴ Farmers' L. & T. Co. v. N. Y. & C., 48 Pac. Rep., 70.
- ⁵ Central T. Co. v. N. Y. & C., 80 Fed., 218.
- ⁶ Kimbal v. Palmer, 80 Fed., 249.
- ⁷ Wright v. Southern, 80 Fed., 260.
- ⁸ D. T. & Ft. W. v. Smock, 48 Pac. Rep., 681.
- ⁹ Edmonds v. Ill. Cent., 80 Fed., 73.
- ¹⁰ B. & M. v. McDuffey, 79 Fed., 934.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

- Chicago, Milwaukee & St. Paul, common, 2 per cent., extra on common, 1 per cent., preferred, 3½ per cent., payable Oct. 21.
- Manhattan, quarterly, 1 per cent., payable Oct. 1.
- New York & Harlem, common and preferred, 2 per cent., payable Oct. 1.
- New York, New Haven & Hartford, quarterly, 2 per cent., payable Sept. 30.
- Norwich & Worcester, quarterly, 2 per cent., payable Oct. 1.
- Pittsburgh, Youngstown & Ashtabula, semi-annual, preferred, 3½ per cent., common, 3 per cent., payable Sept. 25.

- Troy (N. Y.) City, 1 per cent., Sept. 10.
- United Traction and Electric (Providence, R. I.), ½ per cent., payable Oct. 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

- Atlantic & North Carolina, annual, Sept. 23.
- Carolina Central, annual, Wilmington, N. C., Oct. 7.
- Manhattan, annual, New York, Nov. 10.
- St. Paul & Duluth, annual, for the election of three directors and other business, St. Paul, Minn., Oct. 14.
- Seaboard & Roanoke, annual, Portsmouth, Va., Oct. 5.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

- The American Society of Civil Engineers meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.
- The American Society of Railroad Superintendents will hold its next meeting at Nashville, Tenn., beginning Sept. 22.
- The American Street Railway Association will hold its sixteenth annual convention in Convention Hall, Niagara Falls, Oct. 19-22, 1897.
- The Association of Engineers of Virginia holds its formal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.
- The Association of Railway Superintendents of Bridges and Buildings will hold its seventh annual convention at the Brown Palace Hotel, Denver, Col., beginning Oct. 19, 1897.
- The Boston Society of Civil Engineers meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.
- The Canadian Society of Civil Engineers meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.
- The Central Railway Club meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.
- The Civil Engineers' Club of Cleveland meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.
- The Civil Engineers' Society of St. Paul meets on the first Monday of each month, except June, July, August and September.
- The Denver Society of Civil Engineers meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.
- The Engineers' Club of Columbus, (O.), meets at 12½ North High street, on the first and third Saturdays from September to June.
- The Engineers' Club of Minneapolis meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.
- The Engineers' Club of Philadelphia meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.
- The Engineers' Club of St. Louis meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.
- The Engineers' Society of Western New York holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.
- The Engineers' Society of Western Pennsylvania meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.
- The Montana Society of Civil Engineers meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.
- The New England Railroad Club meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.
- The New York Railroad Club meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.
- The North-West Railway Club meets on the first Tuesday after the second Monday in each month, at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.
- The Northwestern Track and Bridge Association meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.
- The St. Louis Railway Club holds its regular meeting on the second Friday of each month, at 3 p. m.
- The Southern and Southwestern Railway Club meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.
- The Technical Society of the Pacific Coast meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.
- The Western Foundrymen's Association meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.
- The Western Railway Club meets in Chicago on the third Tuesday of each month, at 2 p. m.
- The Western Society of Engineers meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736 1736 Monadnock Block, Chicago.

Engineers' Society of Western New York.

The regular monthly meeting was held at the Society's rooms, in the Buffalo Library, on Monday, Sept. 13, at 8 p. m., instead of Sept. 6 (Labor Day). The paper of the evening was entitled "Some Notes on the Manufacture of Open Hearth Steel."

American Society of Civil Engineers.

A regular meeting was held at the Society House on Wednesday, Sept. 15. A paper by J. L. Van Ornum, Assoc. M. Am. Soc. C. E., entitled "Theory and Practice of Special Assessments" (see Proceedings for August, 1897, already issued), was presented for discussion.

National Railroad Master Blacksmiths' Association.

The national convention of Railroad Master Blacksmiths adjourned at the Leland Hotel to meet in Boston next year on the second Tuesday in September. The following officers were elected: President, John Buckley, Chicago; Vice-Presidents, W. W. McClellen, Denver; G. Garbrant, Paterson, N. J.; Secretary-Treasurer, George F. Hinkins, Duluth.

Western Foundrymen's Association.

The fall meeting of the Western Foundrymen's Association of Chicago will be held in Cincinnati, O., beginning Oct. 18 and lasting two or three days. Arrangements have been made for the reading and discussion of numerous papers and for visits of inspection to the principal establishments of interest about Cincinnati. Reduced railroad rates from Chicago have been secured, also special hotel rates at Cincinnati, for all who attend the meeting.

American Association of General Baggage Agents.

The seventeenth annual convention of this Association will be held at Brown's Palace Hotel, Denver, Col., on Wednesday, Oct. 13. It is expected that arrangements will be completed with the Pullman Company so that all paying Pullman fare going will be furnished upon presentation of their berth checks at Denver with free transportation returning. The following gentlemen will, in accordance with request of the President, prepare and present papers on subjects of their own selection. R. R. Bentley, G. B. A., Pennsylvania; Geo. Byram, G. B. A., Fitchburg; E. A. Sadd, G. B. A., Chicago, Burlington & Quincy.

St. Louis Railway Club.

The September meeting of the St. Louis Railway Club was held on Sept. 10 at the Southern Hotel. There was a good attendance after the summer recess and 30 new members were elected. Applications for membership from 25 people were received and referred. The paper of the session was that by Mr. J. A. Gohen, Master Car Painter of the Big Four, Indianapolis, on "The Care and Sanitation of Passenger Equipment at Terminals." Under the rules the paper will be discussed at the next meeting. Mr. Gohen takes the position that car cleaning should be handled by an exclusive force under well defined rules and under the immediate control of the general foreman of terminals.

Western Railway Club.

The next regular meeting of the Western Railway Club will be held Sept. 21, in the Auditorium Hotel, Chicago. Two short papers will be presented and discussed, one entitled, "How Can Shop Organization Be Made More Efficient?" by Mr. L. L. Smith, the other, "Machine Tools from Another Point of View," by Mr. J. W. Gardner. The paper presented at the May meeting, by Mr. Thomas Appleton, "Water Supply Stations for Locomotives," will be discussed. Immediately after the adjournment of the meeting, the Fifth Annual Banquet of the club will be held in the Auditorium Hotel. Those wishing to attend the banquet are requested to so advise the Chairman of the Committee of Arrangements, Mr. Geo. S. Bigelow, No. 1408 Fisher Building, Chicago. The price per plate will be \$3.

PERSONAL.

—Mr. Norman Beckley, General Agent of the Cleveland, Cincinnati, Chicago & St. Louis, at Elkhart, Ind., has resigned.

—Mr. J. D. Schultz, after five years of service, has resigned as General Roadmaster of the Rome, Watertown & Ogdensburg.

—Mr. J. V. Parker, General Freight and Passenger Agent of the Omaha, Kansas City & Eastern, with headquarters at Quincy, Ill., has resigned.

—Mr. H. A. Gilles, heretofore Master Mechanic of the Norfolk & Western, has been appointed General Superintendent of the Richmond Locomotive Works.

—Mr. W. L. Adams, Agent of the Blue Ridge Dispatch, at St. Louis, Mo., died at his home Aug. 31, aged 31 years. He is to be succeeded by Mr. K. B. Hannigan.

—Mr. Peter H. Schreiber, Division Master Mechanic of the Cincinnati, New Orleans & Texas Pacific, at Chattanooga, Tenn., died at his home in that place, Sept. 9, of apoplexy.

—Mr. A. S. Markley, Superintendent of Bridges and Buildings of the Pittsburgh & Western, was killed by a fall from the top of a water tank he was inspecting at Wildwood, Pa., Sept. 9.

—Mr. F. G. Frink has resigned as Instructor of Architecture in the Chicago Athenaeum and the Public Manual Training School to accept the Chair of Civil Engineering in the Idaho State University at Moscow. Mr. Frink graduated at Ann Arbor in 1886, and has since done engineering and superintending for several Chicago corporations.

—Mr. D. C. O'Reilly, heretofore Assistant General Freight Agent of the Oregon Railroad & Navigation Co., with headquarters at Portland, Ore., has been appointed General Manager of the Columbia Southern, with headquarters at Wasco, Ore. Previous to his connection with the Oregon Railroad & Navigation Co., Mr. O'Reilly was connected for 13 years with the Union Pacific.

—Mr. Edward G. Dixon died at his home in Philadelphia, Sept. 6, aged 63 years. Mr. Dixon had been connected with the Pennsylvania Railroad for nearly 25 years. He was agent for the company in New York City for 10 years and in 1888 was appointed Division Freight Agent of the United Railroads of New Jersey Division, with office in Philadelphia. He continued in that latter position until stricken with paralysis about two years ago.

—Mr. Orin P. McCarty has been appointed General Passenger Agent of the Baltimore & Ohio Southwestern, with headquarters at Cincinnati, O., to succeed Mr. J. M. Chesbrough. Mr. McCarty held this position from Nov. 1, 1893, to September, 1894, being appointed General Traveling Passenger Agent of the Southern Pacific in October of the latter year. He was afterward appointed Assistant General Passenger and Ticket

Agent of the Atlantic System of the Southern Pacific and has held that office up to the present time.

—Mr. A. J. Cassatt has been elected a member of the Board of Directors of the Union Traction Co., of Philadelphia, to fill the vacancy caused by the recent resignation of Mr. Caleb F. Fox. Mr. Cassatt graduated from the Troy Polytechnic Institute in 1859, and has been connected with the Pennsylvania Railroad since 1861, filling the positions of General Superintendent, Third Vice-President and First Vice-President. He has been a member of the Board of Directors of the Pennsylvania for many years. Since 1885 he has been President of the New York, Philadelphia & Norfolk, and in 1891 was at the head of the Commission to arrange plans for an intercontinental railroad to connect North and South America.

—Mr. William H. Moore, late General Passenger Agent and Auditor of Passenger and Freight Accounts of the Newburgh, Dutchess & Connecticut, died in Matteawan, N. Y., Sept. 10, aged 55 years. Mr. Moore entered railroad service in August, 1866, as Receiving Freight Clerk of the Erie at New York. He continued in the employ of that road until May 20, 1870, when he went to the Dutchess & Columbia as Station Agent at Fishkill Landing, N. Y. He was appointed clerk in the Superintendent's office of the New York, Boston & Montreal on July 10, 1873, continuing in that position until May 1, 1877, when he was made Chief Clerk of the Newburgh, Dutchess & Connecticut. He was appointed General Passenger Agent and Auditor of Passenger and Freight Accounts of that company Dec. 26, 1881, and held that office until the latter part of 1895.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—J. Brinker has been appointed General Agent in charge of freight and passenger business, with headquarters at Salt Lake City, Utah.

Baltimore & Ohio Southwestern.—Orin P. McCarty, heretofore Assistant General Passenger and Ticket Agent of the Atlantic System of the Southern Pacific, has been appointed General Passenger Agent, with headquarters at Cincinnati, O., to succeed John M. Chesbrough.

Baltimore, Chesapeake & Atlantic.—T. A. Joynes has been appointed Purchasing Agent, with headquarters at Baltimore, Md.

Burlington, Cedar Rapids & Northern.—E. O. Soule, Trainmaster at Cedar Rapids, Ia., has been appointed General Agent of the Passenger Department, with headquarters at Cedar Rapids. He is succeeded by O. H. McCarty.

Chicago Great Western.—At the annual meeting of stockholders, held at Chicago Sept. 9, the following three directors, whose terms had expired, were re-elected: C. W. Benson, S. C. Stickney and J. W. Lusk, all of St. Paul. F. Weyhauser was elected a director to succeed William Dawson, resigned.

Chicago, Rock Island & Pacific.—George E. Wagner, heretofore Ticket Agent of the Chesapeake & Ohio, at Higginsport, O., has been appointed Traveling Passenger Agent, with headquarters at St. Paul, Minn. The appointment took effect Sept. 15.

Cincinnati Northern.—The general offices which were heretofore located at Toledo have been removed to Van Wert, O., affecting the following officials: Frank B. Drake, General Manager; W. F. Booth, Auditor; C. W. Cooke, General Freight and Passenger Agent; O. A. Wilson, Cashier and Paymaster; W. D. Stearns, Car Accountant.

Cleveland, Cincinnati, Chicago & St. Louis.—W. P. Orland has been appointed Master Mechanic of the St. Louis Division, with office at Mattoon, Ill., to succeed G. S. McKee, resigned to take service with another company. H. G. Hudson has been appointed Master Mechanic of the Cairo Division, with headquarters at Mt. Carmel, Ill., to succeed Mr. Orland.

Columbia Southern.—D. C. O'Reilly, heretofore Assistant General Freight Agent of the Oregon Railroad & Navigation Co., at Portland, Ore., has been appointed General Manager, with headquarters at Wasco, Ore.

Fitchburg.—C. L. Mayne has been appointed General Superintendent, with headquarters in Boston, Mass., to succeed W. D. Ewing, resigned. Mr. Mayne was appointed Assistant Superintendent of the road several months ago.

J. R. Hartwell has been appointed Superintendent of the Tunnel and Fitchburg divisions, with headquarters at Fitchburg, Mass.

Illinois Central.—J. C. Clair has been appointed New England Agent, with headquarters at Boston, Mass., to succeed F. A. Florence, transferred to New York City. Hunter C. Leake has been appointed General Agent at New Orleans, to succeed M. R. Spelman, resigned. The appointment took effect Sept. 1.

Intercolonial.—W. B. McKenzie, heretofore Assistant Engineer, has been appointed Chief Engineer, to succeed P. S. Archibald, resigned. T. C. Burpee has been appointed Assistant Engineer.

Kansas City, Pittsburgh & Gulf.—David Patterson has been appointed Master Mechanic of the Southern Division, with headquarters at Shreveport, La. His jurisdiction will extend from Mena, Ark., to Port Arthur, Tex.

Lancaster & Chester.—At the annual meeting of the Directors L. T. Nichols was elected General Superintendent, with headquarters at Chester, S. C. Mr. Nichols is also Superintendent of the Carolina & Northwestern (formerly Chester & Lenoir), which connects with the Lancaster & Chester at Chester.

Lehigh Valley.—James I. Blakslee having resigned the position of Superintendent of the Pottsville Division, that office has been abolished, and that division will hereafter be operated as the Pottsville Branch of the Lehigh Division.

Louisville, Evansville & St. Louis.—John P. Moffatt has been appointed Passenger Agent, with headquarters at Knoxville, Tenn.

Massachusetts Valley.—At the recent annual meeting of stockholders of this company, a leased line of the Boston & Maine, the following officers were elected for the ensuing year: William White, President; A. T. Foster, Vice-President; John G. Foster, Secretary; James H. Williams, Treasurer.

New Orleans & Western.—Alfred B. Gilles has been appointed Secretary, with headquarters at New Orleans, La., to succeed D. B. Morey, resigned.

Ohio River.—J. H. Hamilton, of Salt Lake City, has

been appointed Superintendent and will have charge of the Transportation Department.

Oregon Short Line.—W. E. Coman has been appointed Traveling Freight Agent, with headquarters at Portland, Ore., to succeed E. E. Ellis, resigned.

M. W. Bacon has been appointed General Agent at Butte, Mont. The office is a new one.

Passumpsic River.—At the annual meeting of stockholders of this company, a leased line of the Boston & Maine, held recently at Newport, N. H., the following officers were elected: President, Amos Barnes, Boston; Treasurer, J. H. Williams.

Peoria, Decatur & Evansville.—A. L. Davis has been appointed Chief Engineer, with headquarters at Mattoon, Ill.

Pittsburgh & Lake Erie.—W. A. Terry, formerly Commercial Agent of the Cincinnati, Hamilton & Dayton, with headquarters at Pittsburgh, Pa., has been appointed Assistant General Freight Agent of this company.

Pittsburgh, Johnstown, Ebensburg & Eastern.—The officers and directors of this company, whose incorporation is noted in another column, are as follows: President Samuel P. Langdon, Philadelphia; Directors, G. T. Simonton, S. B. McConnell, John A. Baker, Lewis G. Dutton, R. S. Reed and C. F. Camp, all of Philadelphia.

Port Jervis, Monticello & New York.—At the annual meeting of stockholders, held at Port Jervis, N. Y., Sept. 6, directors were elected as follows: T. M. Waller, G. N. McKibben, F. H. Reed, S. H. Wagner, W. C. Orton, Jesse Boynton, H. H. Porter, Jr., Martin B. Waller, M. S. Stevens, Schuyler C. Carlton, William E. Scudder, Sidney H. Dawson and Warren A. Spaulding.

St. Louis & San Francisco.—H. B. Worden, who was appointed Contracting Freight Agent at Denver, Colo., last April, has been appointed Traveling Freight and Passenger Agent, with supervision over the road and its interests in Colorado, Wyoming, Arizona and New Mexico. C. N. Wood has been appointed Contracting Freight Agent in Denver, to succeed Mr. Worden.

St. Louis, Peoria & Northern.—A. L. Moler, formerly with the Cincinnati, Hamilton & Dayton, has been appointed Master Mechanic of the St. Louis, Peoria & Northern, with headquarters at Springfield, Ill.

W. J. McLean, heretofore General Passenger and Ticket Agent of the Chicago, Peoria & St. Louis, has been appointed General Passenger Agent. The appointment will take effect Oct. 1.

Toledo, Peoria & Western.—At the annual meeting of stockholders, held Sept. 9, Franklin H. Head and C. M. Dawes were elected directors for two years and Joseph Wood a director for one year.

Toledo, St. Louis & Kansas City.—At the annual meeting of stockholders held at Toledo, O., Sept. 9, the following directors, whose terms had expired, were re-elected: John P. Morris, S. H. Kneeland and Joseph S. Stout, of New York, and S. K. Wilson, of Trenton, N. J. The other members of the Board are: R. G. Ingersoll, J. S. Laidlaw, J. O. Osgood, Clarence Brown, A. L. Mills, M. L. Crowell, Charles Miller and F. J. Sawyer.

Union Pacific.—A. J. Ratcliffe, Traveling Passenger Agent, with headquarters at Salt Lake City, is transferred to St. Louis, Mo., to succeed W. F. Haight, deceased.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Alaska Railroads.—The Yukon Railroad Co. was incorporated in New Jersey Sept. 11 with a capital stock of \$600,000, to build a line in Alaska from Skagway over the White Pass, in the Chilkoot Mountains, to the head of Lake Bennett. The incorporators are James McNaughton, James B. McGovern, New York, and F. C. Farnham, Seattle, Wash.

The Canadian Pacific is seriously considering building a standard gauge railroad into the Klondike from a point at or near Glenora on the Stikene River, to Lake Teslin, the head of navigable waters of the Yukon. General Superintendent R. Marpole, of the Pacific Division, has received instructions from Montreal to select competent men who shall proceed to the locality and make surveys for the most feasible route. Mr. E. J. Duchesney, Superintendent of the Kootenay Division, and Mr. J. H. Cambie, Division Engineer, at Vancouver, have the survey in charge. The intention is to place a swift line of steamers on the route from Vancouver, B. C., to the mouth of the Stikene River. Another line of steamers will carry the passengers from Teslin Lake down the Yukon River.

A company is being organized in San Francisco to be known as the Alaska Central, with a capital of \$5,000,000 to build a narrow gauge railroad about 322 miles long from tide water on Prince William Sound, which is about 100 miles east from Mt. St. Elias, north up the valley of the Copper River and then eastward across the Divide to a point on the Yukon River near the east boundary line. Among the promoters are John Underwood, of San Francisco; Elijah Smith, of New York; John W. Cudahy and P. D. Armour, of Chicago.

W. A. Pratt, the engineer sent by the Yukon Mining, Trading & Transportation Co., of Wilmington, Del., to make a preliminary survey for a railroad into the Yukon country (see this column of Aug. 6), has returned to Seattle, Wash., and reports satisfactory results. The proposed road is to be 162 miles in length, running from the head of the Youkon Inlet to Lake Teslin, which is at the head of the Hootalinqua River, one of the principal tributaries of the Yukon. The heaviest grade is three per cent.

Astoria & Columbia.—The work of grading on this road is nearly completed and tracklaying and ballasting are expected to begin in October. Messrs. Honeyman D. Hart & Glenn, of Portland, Ore., the contractors, have at present 900 men and 175 teams at work. The road, when completed, will extend from Astoria, Or., east to Goble, about 57 miles. About seven miles of track are already laid from Astoria east. The contract for bridge work has been let to Messrs. Wakefield & Bridges, of Portland. The bridge over Blind Slough, near Nampa, is ready for the draw.

Boise, Nampa & Owyhee.—The new steel bridge of this road across the Snake River has been completed. The road as projected is to run from Nampa, Ida., a point on the Union Pacific, south 18 miles to Silver City and De Lamar, Ida. Tracklaying has been completed from Nampa to the Snake River. It is proposed ultimately to extend the road to Winnemucca, Nev.

Calumet Western.—This company was incorporated in Illinois Sept. 2, with a capital stock of \$200,000, to build a road from South Chicago south about six miles across the Calumet River and along the western boundary

of the Indiana state line to Hegewisch, Ill. The incorporators and directors are: J. T. Brooks, Salem, O.; Joseph Woods, Pittsburgh, Pa.; William Borner, J. W. Belz, George Willard, J. W. Renner and E. B. Taylor, of Chicago.

Colorado Valley.—Work has been begun on this road, which is projected to extend from Colorado, Tex., a point on the Texas & Pacific, southeast to San Antonio, the terminus of the Gulf, Colorado & Santa Fe. The contract was given in June (see this column for June 11) to the Toledo Construction Co., of Toledo, O. W. Wheatcroft, Robert Lee, Tex., is General Manager.

Detroit & Mackinac.—The contract for the first 20 miles of extension of this road from La Roche, Mich., northwest to Onaway, has been let to M. J. Griffin, of Detroit. Surveys are under way for 22 miles additional from Onaway to Cheboygan.

Florence & Cripple Creek.—The firm of Dumphy & Nelson, of Pueblo, Colo., has been awarded a contract for building the extension of this road, which is to run from Victor northeast nine miles to Goldfields, Colo. Work was begun Sept. 2.

Kansas City, Pittsburgh & Gulf.—The last rail was laid and the last spike driven on this road at 3 p. m., Sept. 11, thus uniting Kansas City and Port Arthur on the Gulf of Mexico. The event was celebrated at Kansas City and other points along the line. It is expected that passenger trains will begin running over the last section on Sept. 18. The road as completed extends from Kansas City, Mo., south to Port Arthur, La., with a branch of 21 miles from DeQuincey, La., to Lake Charles, a total of 756 miles.

Madison.—This company was incorporated in Illinois Sept. 10, with a capital of \$2,500, to build in Madison County, Ill., from Venice east about 10 miles to Collinsville, a point on the Vandalia. The incorporators are: G. A. Wilson, John S. P. Gordon, Charles Ray Dean and W. H. Hadley, of Collinsville, and William B. Dean, of St. Louis.

Mexican Roads.—Three French engineers are surveying for a line to run from Inguaran in the State of Michoacan, north and west about 150 to 160 kilometers (81 to 93 miles) to connect with the Mexican National at either Patzcuaro or Uruapan as the topography of the country may indicate. There are extensive copper mines in Inguaran and the new road is projected to give the ore an outlet. No concession as yet has been formally asked from the Government, but application will be made soon as the route has been determined upon.

Middle Fork.—This company was incorporated in West Virginia, Aug. 28, with a capital stock of \$200,000, to build a road from the mouth of the Middle Fork River to the mouth of the Cassity Fork River, in Randolph County, W. Va. The incorporators are: Charles G. Blatchley, E. A. Messler, Philadelphia, Pa.; Floyd Teter, Belington, W. Va.; Henry G. Blatchley and Charles A. Blatchley, Grafton, W. Va.

New Roads.—F. P. Anderson, of Joplin, Mo., and E. H. Brown, of Girard, Mo., have secured the contract for building a road from Sapulpa, I. T., to Guthrie, Okla. It is to be built for the Associated Coal Companies and will traverse the Creek country for about 100 miles. This company has leased nearly 2,000,000 acres of coal lands in that part of the territory.

Halverson, Richards & Co., of Minneapolis, Minn., are beginning work on a 12-mile line of standard road into the Red Lake Indian reservation to permit them to handle their contract, recently taken, for the cutting of 300,000,000 ft. of pine timber recently sold there by the government for the benefit of the Indians.

New York, Susquehanna & Western.—Grading along the line of the Susquehanna Connecting, the extension of Wilkes-Barre & Eastern Division of the New York, Susquehanna & Western, is reported to be completed. It is said that the ties and rails are laid and that trains will begin running about Oct. 1. The new road extends from Wilton, Pa., southwest 22 miles to Paddy's Land. Its traffic will be mostly coal.

Northern Pacific.—Engineers with provisions for two months are reported to be surveying a branch from a point near Rockdale, Mont., south up the Clarke's Fork Valley. It is expected that the survey will extend to the Bear Creek coal mines, three miles east of Red Lodge.

Oxford County.—The Maine Board of Railroad Commissioners has approved the location of this road, which is projected to be built from a point on the Grand Trunk, near Woodstock, Oxford County, Me., passing through the Milton plantation, Rumford, Peru and Mexico, to a point on the Rumford Falls and Rangeley Lakes, about 25 miles. The road is now under construction and about six miles have been graded.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The extension of the New Cumberland Branch running from New Cumberland, W. Va., north 17 miles to Kenilworth, a point on the Ohio River opposite East Liverpool, O., was opened Sept. 4. A bridge connects the extension with East Liverpool.

Pittsburgh, Johnstown, Ebensburg & Eastern.—This company was incorporated in Pennsylvania Sept. 14 for 999 years, with a capital of \$1,500,000, to build a road from a point at or near Johnstown, Pa., on the Baltimore & Ohio, east about 60 miles from Ebensburg to a point at or near Phillipsburgh, Center County, on the Beech Creek. The officers and directors will be found in another column.

Southern.—Surveys have been completed for the extension of the North Carolina Midland Division from Mocksville, N. C., southwest about 35 miles to Mooresville, a point on the Charlotte & Taylorsville Division.

Southern Pacific.—This company is making some changes in the location of its main line tracks in Cochise County, Ariz., to afford protection from damages by floods. The changes affect about four miles of track at Railroad Pass and about three miles at Dragon Summit. There are no important structures on either line, the work being extremely light. What few trestles and openings there are are being built of creosoted lumber, as usual in renewals, and the track is being laid with 75-lb. rails.

Staceyville.—The Mississippi Valley Construction Co., of Chicago, has secured the contract for building this road, whose incorporation was noted in this column June 25. Work was begun on Sept. 4, and by the terms of the contract the road is to be completed by Oct. 1. It is to run from Staceyville, Ia., west about eight miles to a point near Mona, on the Illinois Central.

Sumpter Valley.—This company is reported to have purchased 110 narrow gauge freight cars from the Oregon Short Line to be used in building its extension from

Baker City, Ore., east about 50 miles to the mining district in the Seven Devils Mountains, Ida. It is reported that the company has also purchased rails for this road. The present road extends from Baker City west to Sumpter, 31 miles.

Washington & Chesapeake Bay Construction Co.—This company was incorporated in Denver Sept. 2, to build the abandoned Washington & Chesapeake Beach Railroad from Washington, D. C., east about 30 miles to Chesapeake Beach. The incorporators are: Otto Mears, David H. Moffat and Henry L. McNeill, Denver, Colo.; Charles Poppe, New York; and A. C. Dunn, Washington, D. C. Right of way has been secured along most of the route, and the cost to obtain the remainder is placed at \$15,000. The company owns 710 acres of land with a beach frontage of 12,400 ft. The track extends back from the beach a distance of 1½ miles, and the ground has been subdivided into lots. Over \$225,000 has been expended upon the property by the former owners. The company will build a seaside hotel with dancing pavilions, a casino and other attractions to draw the excursion trade of Washington and Baltimore.

West Virginia Central & Pittsburgh.—It is reported that this company is making surveys for an extension from Beverly, W. Va., south about 40 miles to the headwaters of the Tygharts Valley River.

Electric Railroad Construction.

Baltimore, Md.—Work on the Baltimore & Northern Electric Railway is progressing. The road connects with the Charles street line of the Baltimore City Passenger Railway Co., at Lafayette avenue and Charles street, and by a traffic arrangement with the latter company cars of the Baltimore & Northern will be run to Calvert and Baltimore streets over its line. The entire road will be completed in about a month, and it will give a direct route from the central part of the city to Pikesville by way of Mt. Washington.

The Baltimore, North Point & Bear Creek Railroad Co. of Baltimore, has asked for authority to build a double track railroad on the Mount Carmel road through its entire length, a distance of about two miles.

Battle Creek, Mich.—The entire right of way has been secured for the electric railroad between Battle Creek, and Gull Lake and Kalamazoo.

Brooklyn, N. Y.—The Brooklyn Heights Railroad Co. has filed its application with the Brooklyn Bridge Trustees for the use of Liberty street, from Sands to Fulton street, for a double-track road. The company also asks for the privilege of laying side tracks at the present bridge terminal.

Chester, Pa.—Ordinances granting extensions of time to the Philadelphia & Delaware River Railway Co. and to the Media, Middletown & Aston Railway Co., have passed councils and been laid over.

Depew, N. Y.—The State Railroad Commission has given a hearing on the application of the Buffalo & Depew Electric Railway Co., for permission to build its proposed road between Depew and Buffalo. The application has been opposed by the Buffalo, Bellevue & Lancaster Railroad Co., on the ground that sufficient railroad facilities are afforded to meet the present requirements.

Hancock, Md.—The route between Hancock and Blair's Mill, Pa., through McConnellsburg is being surveyed. It will be used for both freight and passenger service.

Houston, Tex.—A report states that the contract has been let for building the Galveston & Houston Electric Railroad, which is to run between the two cities mentioned in the title. Work is to be begun by Oct. 15 and completed by April 1, 1898.

Lewisburg, Pa.—A charter has been granted by the State Department for an electric road between Lewisburg and Watsonstown, a distance of about 10 miles, and work will be begun very soon. It is stated that a large part of the right of way has been secured, and that the boroughs through which the road will pass are preparing to pass the ordinances granting right of way. It is probable that the road from Lewisburg to Milton will be finished this fall.

Lineoleumville (Staten Island), N. Y.—The Staten Island Electric Railroad has begun to lay rails from Lineoleumville to Bull's Head.

Mt. Vernon, N. Y.—The *Daily Argus* states that the franchise and rolling stock of the City Island & Bartow Horse Railroad has been transferred to a New York syndicate, and it will begin at once to change the motive power to electricity and extend the road to connect Pelham with Mt. Vernon.

New York.—Five thousand men are at work on the Fourth Avenue road, and President Vreeland states that cars will be running a part of the line by next month. The power-house at Ninety-eighth street and the East River is now being built and will be ready by the time track construction has been finished. There are many features about its construction that are novel and when completed will be the longest road anywhere operated on the electric conduit system.

Norfolk, Va.—The Board of Directors of the Norfolk Southern Street Railway Co. have accepted the location granted in the towns of Norwood, Walpole, Foxboro and Mansfield.

Omaha, Neb.—The electric railroad company, which recently secured a permit to build a line in certain parts of the city, desires the right to run to the Exposition grounds, which will be located outside the city limits.

Palmer, Mass.—The stockholders of the Palmer & Monson Street Railroad met and organized on Sept. 11 and chose directors. The President is C. F. Grosvenor and the Treasurer is Rufus Flynt. The company proposes to build an electric railroad from Palmer southward four miles to Monson.

Perth Amboy, N. J.—The Perth Amboy Council will meet Sept. 20 to consider the application of the Brunswick Traction Co. for permission to build an electric road within the corporate limits. Six miles of track are at present proposed.

St. George, S. I., N. Y.—The Midland Electric Railway Co. is extending its line on Haytt street, which will bring the terminus of the road within 200 yards of St. George Ferry. The company was formerly prevented from making this connection by an injunction which was dissolved on the 11th inst.

St. Louis, Mo.—The North & South Railway bill, which is but a modification of a similar bill introduced several weeks ago, as noted in our columns, has come up again for action. The bill grants franchises to build

about eight distinct branches in St. Louis and to pay the city \$10,000 a year the first ten years, \$15,000 for the second ten and \$15,000 for the third ten.

Shamokin, Pa.—The Shamokin-Mt. Carmel Electric Railroad will probably be extended to Ashland in the near future. The ordinance which was presented at the Centralia Council last week was not approved, but an adjourned meeting was held the latter part of this week and it was thought that the Council would grant the desired franchise.

Wilkinsburg, Pa.—Council has passed and Burgess McClain has signed the ordinance granting the Consolidated Traction Co. a franchise.

Wilmington, Del.—Work was begun this week on the construction of the Wilmington & Elsmere Electric Railway which will connect the town of Elsmere with Wilmington. The line will be about two miles long and will make connections with the lines Wilmington City Railway Co., in all parts of the city.

GENERAL RAILROAD NEWS

Cape Fear & Yadkin Valley.—The New York Bondholders' Committee has filed a bond upon the decision of Judge Simmons (see this column for June 25), made in the Circuit Court at Raleigh, N. C., ordering the sale of this road as a whole according to the contention of the Baltimore Committee instead of in sections represented by the three series of bonds as desired by the New York bondholders. The upset price of the road has been fixed at \$2,000,000 with a deposit of \$30,000 from each bidder. The road extends from Wilmington to Mt. Airy, N. C., 248 miles, with several branches.

Colorado Midland.—At the foreclosure sale of this road, held at Colorado Springs, Colo., Sept. 8, the property was bid in by Henry T. Rogers, of Denver, representing the Central Trust Co., of New York, for \$295,000. The upset price, according to the decree of the United States Court, was \$250,000 for the first mortgage and \$40,000 for the second. The sale was confirmed by Judge Caldwell of the United States Circuit Court at Denver, Sept. 12. The reorganization has been arranged and will be effected in New York. The entire capital stock of the company is owned by the Atchison, Topeka & Santa Fe. A receiver was appointed on May 1, 1894. The main line extends from Colorado Springs, Colo., to Newcastle, 224 miles, with 120 miles of branches and leased lines.

Delaware River & Lancaster.—Master A. P. Wintersteen made a public sale of this road at West Chester, Pa., Sept. 14 to Charles L. Kingsley, representing a New York Syndicate. The purchaser pays \$6,500 and assumes 10 liens, aggregating \$8,300. The road extends through Chester County, Pa., from the Falls of French Creek west 12 miles to St. Peters. It has not been operated for several years.

Detroit, Toledo & Milwaukee.—This company has made a contract with the Chicago & West Michigan to run trains over that road from Allegan to Grand Haven. This company has recently acquired the Michigan Division of the Cincinnati, Jackson & Mackinaw, which gives it an outlet to Allegan. By the new arrangement trains will be run to Grand Haven, where connection will be made by boat with Milwaukee.

Emmitsburg.—This road was sold at public auction for \$29,500 at Frederick, Md., Sept. 11, to a syndicate representing the bondholders. There is seven years arrearage of interest on the bonded debt amounting to \$121,850, which led to the order of sale by the judge of the Circuit Court in July. This line lies wholly in Frederick County, Md., extending 7.6 miles from Rocky Ridge, a point on the Western Maryland, north to Emmitsburg.

Illinois Central.—The earnings for July were as follows:

July:	1897.	1896.	Inc.
Miles operated.....	3,586	3,130	456
Gross earn.....	\$1,981,075	\$1,638,624	\$342,451
Oper. expen.....	1,507,955	1,312,368	195,587
Net earn.....	\$473,120	\$326,256	\$146,864

Kansas City, Pittsburgh & Gulf.—At a special meeting of the stockholders, held in Kansas City, Mo., Sept. 9, it was voted to increase the capital stock from \$20,000,000 to \$23,000,000 for the purpose of building 120 miles more road.

Lehigh & Hudson River.—The earnings for the year ended June 30 were reported as follows:

Year.	1897.	1896.	Inc. or Dec.
Gross earn.....	\$327,077	\$370,972	D. \$43,895
Oper. expen.....	182,383	215,821	D. 33,438
Net earn.....	\$144,694	\$155,151	D. \$10,457
Other income.....	53	4,197	D. 4,144
Total.....	\$144,747	\$159,348	D. \$14,601
Fixed charges.....	142,695	141,063	I. 1,632
Balance.....	\$2,052	\$18,285	D. \$16,233

Louisville, Evansville & St. Louis.—This company began using the New Albany, Belt & Terminal road and the bridge of the Kentucky & Indiana Bridge Co., Sept. 1. The New Albany, Belt & Terminal was purchased by this company on Feb. 25 (see this column for March 6) and the new arrangement gives the road a connection with the Union station at Louisville, Ky., by way of New Albany, O.

Mexican National.—The earnings for July and for the seven months ended July 31 were reported as follows:

July:	1897.	1896.	Inc. or Dec.
Gross earn.....	\$189,525	\$421,014	I. \$231,489
Oper. expen.....	380,245	315,619	I. 64,626
Net earn.....	\$109,280	\$105,395	I. \$3,885

Seven Months:

Gross earn.....	\$3,488,550	\$2,820,400	I. \$668,150
Oper. expen.....	2,613,749	2,124,569	I. 489,180
Net earn.....	\$874,801	\$695,831	I. \$178,970

Minneapolis & St. Louis.—The earnings for the year ended June 30 are reported as follows:

Year:	1897.	1896.	Inc. or Dec.
Gross earn.....	\$2,066,505	\$2,028,300	D. \$38,205
Oper. expen.....	1,199,128	1,201,552	D. 2,424
Net earn.....	\$867,377	\$826,748	D. \$40,629
Other income.....	96,919	87,572	I. 9,347
Total.....	\$964,296	\$914,320	D. \$49,976
Fixed charges.....	590,540	580,540	I. 10,000
Balance.....	\$373,756	\$333,780	D. \$39,976
Dividends.....	245,000	245,000	I. 0
Surplus.....	\$78,756	\$88,780	D. \$10,024